The Builder.

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The Stimulus given by the State to Architectural and Engineering Works.

HERE is no great principle on which we have more felt it to be a duty to insist, when occasion offered, in these columns, than that each art, each science, and each department of business should be dealt with according to its own canons and primary rules. Thus it is for the architect,—and not for the cutting contractor,—to build palaces, no less than churches, mansions, and cottages. It is for the man familiar with the principles of sanitary science,—not for the local representative, whose one object is to keep down the rates, if, indeed, it be not to augment them for some private benefit,—to determine on the sanitary arrangements of urban and rural districts. It is for the educated medical man,—not for the philanthropic amateur,—to tell the world what should be done to give mankind the full benefit of what some hold to be the greatest service ever rendered to the human race,—the great discovery of Jenner. And so it is for the competent statist,—either himself an engineer or guided by the last outcome of the engineer's experience,—to form a judgment as to the advisability, or otherwise, of any great projected public works.

Most of our misfortunes, in the constructive point of view, spring from the neglect of this salutary rule. Do we not see, at this moment, a point of great importance to London,—that of the eastward transit over the Thames,—brought forward on what are called general views; that is to say, in the absence of that definite statistical information which would settle the question, in the judgment of a statesman, but which (for that very reason, may be) each projector scrupulously avoids? Have we not seen how the question of the new public offices, and the utilisation or the spoiling of some of the present sites in London, is made an accident of an accident?

An instructive and, we fear, a very sharp lesson, on this point, is now in course of being taught in France. English people, as a rule, are very little aware of the enormous sums, amounting to from 20 to 22 millions sterling a year, which are now included in the French budget, and borne by the French taxpayers, for the construction of public works in France. Some of these works are not only noble in design, but give full promise of being highly remunerative. Whether the execution by the State of such undertakings be the wisest mode of carrying them out it is not for us to say. It is not, at all events, found suitable in this country. But at the back of undertakings of such national interest that there can be no question (except that above hinted) as to the propriety of their being executed at public cost, come a number of others of purely local interest. It is these works,—schools, by-roads, and what are called secondary railways,—of which the origin is not economical, but political, in which we have long since foreshadowed trouble,—a trouble that now seems to be instant. M. Léon Say, who is the last person to be accused of any want of appreciation of the true value of public works, is seriously alarmed at the continued deficit of the French budget. He points out that all over France works are going on which have cost double the sum at which they were estimated, but which are nowhere finished. It is a reproduction of the old system of the *ateliers*, which broke down so disastrously in Paris. We will not say that it is a close neighbour of that system of public works in Ireland, designed in 1848 as a relief from the pressure of famine, and of which the outcome would be so ludicrous, if it were not so sad. But, at all events, it recalls the memory of that deplorable waste of public funds. And M. Say insists that it is the pressure of local and personal interest on the deputies, and thus on the Ministry of the day, which is the mainspring that sets these wheels in motion.

M. Say's recent utterance, which has been published in the *Journal des Economistes*, has an interest to ourselves, over and above the interest that we must take, on the one hand, in the welfare of our great neighbouring nation, and, on the other hand, in the extension of architectural work and the improvement of communications. He speaks in the most unhesitating way as to the State working of railways. Those of our readers who require any impartial testimony in support of the opinions we expressed as to Mr. Watherston's proposal for the State purchase of the English railways, will do well to read what M. Say has to say on the subject. "The failure," he says,—that is, of constructing and working railways directly by the State,—"is complete and irreparable. The Budget is overladen, while the population, whom it is sought to accommodate, are unsatisfied. . . . . The blunder is colossal." It takes the form of a national disaster. In four years the net yield of the lines forming what is called the old network of the State has fallen off by more than 20 per cent. The proportion of expenses to receipts is yearly increasing. In 1878 it was 76 per cent.; in 1881 it had risen to 84·63 per cent. In three years the deficit has risen to forty millions of francs!

We shall do well to take note of this outcome of State working in France. It has, indeed, to be borne in mind that when the main trunk routes, with a certain amount of branches, are in the hands of great independent companies, the entrance of the State into the field as the constructor and worker of lines which it is not worth while for the companies to make and work, looks like a foredoomed failure. Foredoomed or not, of the failure there is no doubt; and we cannot but attribute this fact in great part to what we have long since pointed out as a grave danger, both in France and in England,—that is to say, the obstinate regarding of a very complicated question from one single standpoint.

Let us grant all that can be said as to the primary importance of communicating roads, railways, canals; on the proper organisation of each in its due place the welfare of a people depends, almost as much as on the cultivation of the ground. In fact, in many parts of the country even more so. Let any one travel along such a line as that from Manchester to Leeds, passing as it does within a few minutes' run from a densely-populated town to a barren moor, and he will understand how it came to pass that the importation of food from abroad took such a different aspect in the eyes of the Manchester manufacturer and of the Leicestershire grazier, or the inhabitants of any rich corn-growing district of the country. But he is a short-sighted friend to the builder who urges the erection of street after street, irrespective of the question what rent may be fairly expected to be forthcoming. It is precisely this mistake that is committed when work is forced,—when houses are built, or roads made, or railways constructed,—in advance of the demands of the population. We are not speaking of a population that grows up with the rapidity of the famous bean-stalk of nursery legend, as is the case in some new countries. But in England, and still more in France, the magnitude of the demands of the future may be, at all events, approximately anticipated. We can tell, if we take the trouble, how many persons would use a new bridge if open to-morrow. So the statist ought to be able to tell how long it would take to create a traffic of 500*l.* per mile over a wild rural district, and he ought to know that until he sees his way to at least such a traffic as that, he will be wofully out of pocket if he constructs a railway even at so low a cost as 5,000*l.* a mile. For all these calculations the data ought to be forthcoming. The mischief is, that those who want works to be done for them, which they are unable or unwilling to do for themselves, are the very last persons to collect and bring forward those data which would show how entirely the required traffic was the creation of imagination, or, to say the least, of a hope that might be long deferred.

As we write come fresh telegrams from Paris, which only intensify the magnitude of the blunders that have been made. M. Herisson, the Minister of Public Works, declares that not only he cannot reduce the sum required for these works in 1883, but that he shall be compelled to spend on the works already commenced the sums voted for the new works. The

new railways which are to be constructed, in order to complete the scheme of M. de Freycinet, represent an aggregate length of 13,700 miles, of which 9,300 miles have been declared of public utility, and 3,470 are in course of construction. But it has been discovered that the original estimate of M. de Freycinet, which was 160,000,000 sterling, is entirely inadequate to the cost of the works in question, which are now estimated at 360,000,000*l.* This is half the sum spent on the entire railway system of this country! However rich, and however powerful, a country may be, it is to court disaster to plunge headlong into such engagements. It is curious to observe that the scheme thus adopted by the French Government assumes almost exactly the proportions attained by the railway mania of 1845 in this country. The 360,000,000*l.* for which the French Government are now to some extent responsible comprises, indeed, works of all kinds (including school houses) besides the 13,700*l.* miles of railway of a secondary character. The railway projects of 1845 in this country covered 20,687 miles of line, requiring a capital of 350,000,000*l.* Out of this, Bills for 3,753 miles, involving a cost of 130,000,000*l.*, received the Royal assent (see *Edinburgh Review* for October last). Thus, if we infer that the weight assumed too hastily for France is three times what the country can bear, we are not without some justification in our own experience.

The railway committee, on November 24, decided unanimously against the State working and administering all the railways of France. It is a matter of deep interest for all concerned in building, or in public works in general, to watch the conduct of our great neighbour under these trying circumstances. But the true value of the experience thus to be attained at the cost of others lies in the light which it throws on the condition of similar projects in England. From all parts of the country, by public and by private announcements, we receive indications of the awakening and direction of public attention to canals. The great Manchester Ship Canal is only one of those schemes which are already in a more or less advanced condition of preparation. For that, the Parliamentary notices will be deposited, we are told, by the time these lines are in the hands of our readers. Then the Corporation of Preston have resolved on improving the navigation of the Ribble, so as to bring sea-going ships up to the wharfs at Preston. The manufacturers of Stoke-upon-Trent are projecting new canal communication, both with the Mersey and the Thames, as well as with the Humber. The purchasers of the Wilts and Berks Canal have obtained from the Board of Trade running powers, at a low maximum rate of charge, over the Kennet and Avon Canal. The Great Western Railway Company are about to have the damages which they have inflicted on the traders of Newport, by the stoppage of the Monmouthshire Canal, assessed by an arbitrator appointed by the Board of Trade. At the present moment every one,—we could cite many instances,—seems to be waiting for a lead,—waiting, probably, to see how the Manchester ship canal comes before Parliament; but, as far as experience is a guide, it only requires one decided step to be taken by one powerful company to awaken a response from end to end of England. At such a moment it is, therefore, very necessary to raise the voice of warning. In 1845 we knew but little either what railways would ultimately cost, or what would be the result of their development. We have now fifty years' experience as to both these conditions. It is time, and we, in common with the railway reporters of the Board of Trade, have often lamented the fact that we are not put by the Parliamentury returns in so favourable a position as are the publicists of almost every other civilised country, for ascertaining with precision the cost of every description of traffic and the value of new schemes. That want stares us in the face, in the anticipation of a renewed activity in the construction of public works. It is a want of which the schemer, the speculator, and the company-monger of the worst sort will not fail to take full advantage; while, on the other hand, it is a want that handicaps the honest and sober advocate of a sound scheme. It is to be hoped that the labours of Mr. Slagg's committee (which has been hitherto obstructed by the proposal to put Mr. Bradlaugh upon it) will throw some light on this subject. The report of the Committee on Railways (rates and fares), or, at all events, the evidence published with that report, gives much valuable information. What we wish to impress upon our readers is that there are signs of the revival of an interest in certain public works, which may be turned either to national welfare or to national disaster. Although all that ought to be known is not known, yet enough is known,—if people look in the right quarter for the knowledge,—to guide the investor in his choice. Let us beware lest we encounter a second 1845; and let us watch with interest the manner in which the French extricate themselves from a liability for 360,000,000*l.*, which it will certainly demand time to meet.

NEWMARKET PALACE, *TEMP.* JAMES I.

BUILDING CHARGES.

The following extracts from the accounts of the Lord Treasurer's Remembrancer, preserved in the Public Record Office, show the cost of materials used in works and building, with the money disbursed for workmen, at Newmarket Palace, from 1609 to 1625. The first for the year 1609 is as follows:—"Alsoe allowed to the said Accompt' for money by him yssued paide & defrayed for worke and Emp'cons & Provi'cons within the tyme of the Accompte donne and bestowed in and aboute his Ma^ts^ house at Newmarkett, viz., Masons ymploied in cutting, fitting, and setting fower Chymney pannells in the new pryvy lodgings and laying the Borders of the same: Carpenters ymploied in fitting and setting up of planks for Dressor boordes in the privy kitchen and Larder, Setting up a pti'con with quarter boordes in the privy Chamber at the stayres head by the Chamber of p^r^sence, taking downe and setting up a paire of staires in the said roome; boording up part of a wall between the Larder and the roome where the provi'cons are laid; fastning of quarters to the walls for hangings in the new privy lodgings; making three new Doores of Oken boordes one between the p^r^sence Chamber and Princes lodgings, and th^r^ between the Lord Fenton's Chamber and his Dyning-roome, and the third for the Prince's wardrobe; making of tables tressells formes and Cupboordes and doing sondry oth^r^ needefull woorke aboute the said house. Bricklayers and Tylers ymploied in paving w^th^ bricks a gutter betweene the King's house and the house next adioyning; making a vantle of bricks from the said gutter throughe the Bottlehouse and greate entrie to convey the Rainewater into the old vantle; paving with paving tyles the floores at the staires foote going up to the pallett chamber; paving of div'se broken places in the hall; making of Raunge; mending the broken harthes and Furnace; setting the panne in the Scullery; tyling div'se broken places over the Privie lodgings & over the olde lodgings about the house; Plaisterers ymploied in lathing and laying with plaister of parris & lyme and haire the outside and inside walles ceelings and p'ticons of the newe lodgings, the stoare-house, the pantry, the buttery, the wyne-seller, and the groomes of the privy chamber their lodging. Thatchers ymploied in covering w^th^ strawe the Back-side of the olde house over the staires which were brought up at thende of the lodgings and over the privy kitchin and scullery. Plombers ymployed in laying w^th^ sheete lead the greate Cornish on the forefront of the newe lodgings, playning and fitting of quart^rs^ for footeplates there and helping to boorde up the pti'con in the p^r^sence. Sawyers ymploied in cutting of timber into div'se and sondry scantlings; and Labourers attending the said woorkmen & doeing sondry other necessary busynesses there; for p'formance of all wh^ch^ woorkes diverse quantities of Em'pcons & Provi'cons have been made and bought, the p'ticulars whereof, with their quantities, nombers, and price, as also the chardge of carriage, wage of artificers, woorkemen, labourers, & others ymploied in these services doe hereafter more p'ticularly ensue, viz."

Then follow the different items, the materials used, with the cost of each, from which it appears that four chimney panels of stone cost 16s. each; 29 ft. 6 in. of border-stone cost 8d. a foot; timber cost 8d. a foot; deals cost 5*l.* 14s. 4d. the 100; ash poles, 6d. each; lime, 8d. the load; sand and gravel, 6d. ditto; bricks, 13s. 4d. per 1,000; laths, 30s. the load, &c. The workmen's wages per day were as follow:—Masons, 18d.; carpenters from 10d. to 18d.; bricklayers, from 14d. to 17d.; plasterers, from 14d. to 22d.; joiners, 18d.; plumbers, 18d.; labourers, from 9d. to 12d.; sawyers, 2s. 6d. the couple. Two clerks of works had 1s. a day each. Piece-workers were paid a lump sum for a certain job,—all materials being found by the king. Richard Griffin, for laying 303½ square yards of bulrush mats in the king's new privy lodgings and the noblemen's lodgings, finding mat-nails, pack-thread, &c., was paid at the rate of 8d. per yard. The total amount expended on the Royal Palace at Newmarket, in this account, was 457*l.* 6s. 4½d.

In the following year 59*l.* 4s. 4d. was expended on the works and buildings at the king's palace at Newmarket. The articles included timber, lime, gravel, sand, hair, solder, binding-rods, reeds, straw, candles, ropes, nails, iron-work, glass, and glazing, to the value of 27*l.* 5s. 4d. Among the workmen employed were carpenters, bricklayers, thatchers, plumbers, joiners, sawyers, and labourers. Thomas Pointer, clerk of the works, was employed for forty days at 4s. per day (including horse-hire). John Pigott received 4*l.* for framing, raising, and boarding a floor in Mr. Bohennon's lodgings in the privy buttery, 16 ft. long and 15 ft. wide, with a new pair of stairs leading up the same, taking down the old roof and raising a new one with a "dormer" window; taking down a partition wall between the privy buttery and pantry, and laying fittings, "he only finding workmanship." Altering a smoky chimney cost 22s. For laths, lime, and hair used in the walls and ceilings of Mr. Bohennon's lodgings, 39s. 4½d. was charged. John Wyatt, the painter, was paid 27s. 1d. for repairing, stopping, and laying in white-lead, colour in oil, twenty-two lights and double casements, &c., in the presence chamber, where also some new timber cornices cost 9s., while the same apartment was embellished with four score and nine yards of bulrush mats at an expense of 49s. 6d.

In the accounts of money laid out on the Palace at Newmarket for the ensuing year, which amounted to 162*l.* 2s. 8d., the sum expended on materials came to 76*l.* 4s. 2d.; land carriage, 9*l.* 5s. 9½d.; wages, 66*l.* 1s. 2½d.; riding charges for the clerk of works and surveyor, 10*l.* 8s.; and 3s. 6d. given in reward to the keeper of the clay-pit for "permittinge fetchinge of xxj lodes at 2d. the lode." These sums were chiefly spent in defraying the cost of taking down two partitions between the prince's bed-chamber and the presence-chamber, "for his highness more easy passage from there into thother," and in mending the ranges in the kitchen, tiling over the king's presence-chamber and divers other lodgings about the house, and soldering and mending cracks in divers gutters. The cost of the materials employed, artisans' and labourers' wages are then given in detail, somewhat similar to, and at about the same rates, as in the preceding accounts.

In the financial year of 1612-1613, 85*l.* 8s. was spent "in and about his Ma^ts^ House of Newmarket" in covering vaults, boarding up partitions, setting up shelves, making sliding windows, tables, trestles and forms, screwing and strengthening the floors that were sunk; tiling divers lodgings, setting up pans, and "layeing of Footpaces," and doing many other needful works there with the materials, quantities, prices, carriage, artificers, &c. The items are much the same as before. Lord Montgomery's lodgings were carpeted like the rooms of the king and the prince [? Henry] with bulrush matting.

For the year 1613-1614, 46*l.* 9s. 11d. was expended upon 10 ft. of oak timber at 8d. the foot; 1,400 of ½ in. boards at 10s. the hundred; and other timber of different thickness; lime, laths, tile-pins, hair, ironwork, nails, glass and glazing were also supplied. A well-rope for the stables cost 2s. 6d., and a bucket for the well 2s. Three loads of gravel and sand were bought at 6d. the load. The carpenters, bricklayers, and tylers were paid at the rate of 1s. 4d. per day, and labourers 1s.

The amount of money expended on the royal palace at Newmarket in the following year was no less than 4,660*l.* 11s. 9½d. This heavy expenditure was chiefly incurred for building with stone and brick a pile of new lodgings for the king, with a great chamber, presence-chamber, &c., and rooms both under and over the same for noblemen and gentlemen of the bed-chamber, as also for other works done there during seventeen calendar months, commencing May 1st, 1614, and ending September 30th, 1615. This account is very long and interesting, and covers two membranes. The cost of

materials and the workmanship was about equally divided. Building ground in Newmarket was cheap in those days. John Ramsey received 5*l.* 10s. "in full payment of the absolute purchase and sale of a parcel of ground containing in length 30 ft., and in breadth 19 ft., whereon part of his majesty's new building is extended, and was taken in to make the said building to range straight." * The walls of the new buildings were three bricks in thickness from the foundation to the ground-floor, and from that elevation upwards they were two bricks in thickness. The garden was enclosed with a new brick wall, and 780 square yards of new bulrush matting were laid in the king's bed-chamber, the prince's lodging, the privy lodgings, the chambers occupied by the Earl of Montgomery, Lord Haddington, and Lord Hayes, and certain lower rooms of the new buildings, which, at 9d. per square yard, cost 39*l.* 17s. 6d.

The works and buildings at the palace for the ensuing year were also considerable, when the cost came to 2,606*l.* 13s. 2d. The new premises consisted of a new brewhouse, "a greate new stable for the great horses," a kennel for the king's privy hounds, with lodgings over them; besides sundry works and repairs about the house and tennis-court; "setting up of div'se postes in the stable close for managing of great horses to runne at the ring," &c.†

Workmen's wages had increased. Masons now received 2s., 22d., 20d., and 18d. each a day; carpenters 2s. 2d., 2s., 22d., 20d., 18d., and 1s.; bricklayers, 2s. 2d., 2s., 22d., 20d., 18d., and 16d.; plumbers from 22d. to 18d.; plasterers, 22d. to 7d.; mat-layers, 22d.; sawyers, 3s. 4d. the couple; joiners, 18d.; lathmakers, 18d.; and labourers, from 1s. 4d. to 10d. Most of the stone used was brought from Northampton; 12*l.* 2s. 8½d. was spent on new bulrush mats for the king's gallery, the withdrawing-chamber, the Lord Chamberlain's bed-chamber, and the apartments of the Earl of Pembroke, Sir George Villiers, Lord Hayes, and the Secretary of State in attendance; the king finding in some cases nails and packthread, and in others "nayles onely." Richard Fann, for looking to and setting the clock, received a present of 8s., while he was rewarded with 2s. 8d. for cleansing the well and digging it deeper. The new stables and the kennel cost 1,704*l.* 19s. 5½d.

In 1616-1617, 2,446*l.* 3s. 0½d. was laid out on the king's establishment at Newmarket in building "a faire lardge newe stable for the great horses, a new doghouse with lodgings over it, a brewe-house, riding-house and store-house, as alsoe levelling the tenis-court with bricks, and laying the same with paveing tyles upon the brycks; thatching the king's hey barne; laying the gutters between the brew-house and store-house; making perti'cons, doores, tressels, and formes; joysting and boordinge of floores, with dooeing sondry other workes and repairs about the said house," &c.‡

During the ensuing year only 467*l.* 15s. 4½d. was spent on this palace chiefly on account of a stable, with lodgings over it, for Sir Thomas Compton; alterations and extensions to the king's great stable; "making great tables, cupboards, tressels, formes, and screens for feasting the Germany prince and Sweden ambassador"; likewise "for bringing up the fence-wall by the tennis-court, and another low fense wall into the churchyard over against the great gates with brick and stone, and in doing sundry other works upon and about the said house," &c.

The accounts for the following year are not extant, but in those for 1619-20, which amount to 2,719*l.* 15s. 6½d., we learn that some old buildings and sheds towards the street were pulled down and the ground cleared for the erection of additional lodgings of brick and stone, a wooden gallery, and offices for the prince. There were also a farrier's office and coachhouses built. The woodyard was enclosed with a stone wall. Lodgings and store-houses were erected for the clerk of works. For framing and raising "a roome on the back side of the kinges privy kitchen for the Marquis of Buckingham, with washing, boarding, lathing, and tileing the same, quartering a partition there"; and setting up racks, mangers, and stalls, and other miscellaneous work, including decorations to the ceiling of Buckingham's new lodgings, considerable expenses were incurred. As usual, new mats were provided for the king's chambers, while in other subordinate parts of the palace the old ones were mended and pieced.

In the year 1620-21 the royal works and buildings at Newmarket cost 975*l.* 2s. 6d. This amount is made up of a variety of miscellaneous items, too numerous and diffuse to mention in detail. A new well was sunk five fathoms deep to serve the king's and prince's kitchen, for which the labourer was paid at the rate of 5s. the fathom. New bulrush mats were supplied for all the principal apartments and stairs of the palace.

The accounts for the ensuing year are of a somewhat similar description, when 238*l.* 2s. 8½d. was laid out on works and buildings in and about the palace.

In 1622-1623 the sum of 253*l.* 2s. 6d. was expended in mending the wainscot, shutting windows and casements in the king and prince's privy lodgings, planking in the prince's great horse-stable, repairing the rack in the king's great horse-stable, a wainscot casement at the end of the tennis-court and the bins in the king's pantry; setting up shelves in the Groom of the Stole's lodging; setting up ledges on the walls of the great horse-stable, with strong pins to hang saddles; setting up a shed to boil fish for the prince, setting up shelves in the lodgings of the prince's secretary, boarding part of a decayed floor in the wardrobe, making a high stool with steps to ascend the top of it for the prince to run at the ring, making a new hearth and range in the king and prince's privy kitchen, mending the hearths and setting the pans in the boiling-house for fish, mending the chimneys in the great and presence-chambers, running up the lower lights in the dog-house, mending the walls in the prince's gallery, new lathing and laying the walls of the stable in the timber-yard with lime and chopped hay, new matting a room for the Marquis of Buckingham and a chamber for the master of the prince's robes, and piecing and mending the broken mats in the king's privy lodgings and the lodgings of the Marquis of Hamilton, the Earl of Montgomery, and the Marquis of Buckingham. Among other expenses, John Straver and Humphrey Warcup received a present of 22d. for carrying letters from Newmarket to London, and 6s. to a labourer for his attendance during five days at the water-side to see the bricks and tiles safely laid up and loaded at Freckenham.

The works and building at the palace at Newmarket for the following year, only cost 187*l.* 9s. 10½d., and included boarding and mending the stalls broken in the "hunting horse stable and in the Duke of Buckingham's stable"; shoring up the old house on the west side of the Court "dangerously shaken with wynds," raising the poles in the dog yard on boards "in bredthe rounde aboute"; bringing up and finishing the stack of chimneys that served the prince's bed-chamber and other buildings, and mending them "for avoydinge the smoake"; taking up the paving-tiles at both ends of the tennis-court and "new paveinge one end agayne." A bucket for the stable well cost 2s. 6d., a well-rope, 2s. 6d., and a leather for the pump, 1s.

The account for the year 1624-5 (which is the last whole year of James I.'s reign in this series)* for works and buildings at the Palace of Newmarket represents a disbursement of 148*l.* 5s. 6½d. It thus appears that 20,383*l.* 13s. 2d. was laid out on this palace during the reign of James I. from the year 1609 to 1625, being an average of about 1,274*l.* per annum.†

J. P. H.

* In 1617 a further purchase of land, consisting of three roods, was made for extensions to the palace, as appears by the following copy of agreement, &c.:—

"Right trustie and right welbeloved Cousin and Councellor, We grete you well; and will and comaund you that vnder or privy Seale being in yor custidie, you cause or £rs to be made foorth in forme following. James, by the grace of God, &c. To the Trer. and Vnder-Trer. of or Exchequr greeting. Whereas Sr John Cotton, Kt, and some of the officers of or works, have made composicon wth Reginold Gawen, of Newmarkett, for a small parcell of land, contayning three roods or thereabouts, lying on the backside of a house in Newmarkett (comonly knowne by the name of the Star), in or County of Cambridge, on wch peece of ground are lately erected a Brewhouse, and a Storehouse for or vse and service. We doe hereby will and comaund you out of the Treasurie remayning in the Receipt of or Exchequr to cause paymt to be made vnto the said Reginold Gawen or his Assignes, of the Some of threescore pounds in satisfaccon for the said peice of ground, wthout accompt, Imprest or other charge to be sett vpon him or them for the same, or any p't thereof. And these, &c. Given, &c. And these or £res shalbe yor sufficient warraunt in that behalfe. Given vnder or Signett at or pallace of Westmr, the sixt day of January, in the fourteenth yeare of or Raigne, France and Ireland and of Scotland the fifteth. R. KIRKHAM.

Endorsed. To or right trustie, and right welbeloved Cousin and Councellor, Edwarde Earle of Worcester, Keeper of or privey Seale."

† A sum of 8s. is charged for extinguishing a fire that broke out in the timber-yard, which at one time threatened to destroy the palace and appurtenances.

‡ Francis Carter, chief clerk of the works, was allowed 40s., which he gave to Sir William Carway for changing 400*l.* in silver into gold "for the easier carriage of it down, and in consideration it was paid ten days sooner than it was due to the king." He was also allowed 73s. 1d. for the charges of himself and three others "for safeguard of the same iiij^or li to Newmarket" (Account No. 55).

* Compare some fragmentary accounts in the British Museum from 1609 to 1614, sub. tit. Newmarket (MS. Add. 12,498). Heavy expenses attended the maintenance of the royal stables at Charing-cross, York, St. Alban's, Hampton Court, Tutbury, Theobalds, Royston, Enfield, &c.

† L. T. R. Works and Buildings, Nos. 46-62. MS. Public Record Office.

DEFECTS IN FURNISHED HOUSES.

A CASE was tried before a judge and jury at Westminster within the last few weeks, in which a landlord sued for rent, and a tenant denied that it was due, as he was obliged to leave the house since it was infested by bugs. The result was a verdict for the landlord, but we gather from the report of the case that the jury did not consider that the house in question was, if we may say so, immoderately infested by bugs. It is well, having regard to this case, that the actual state of the law in regard to defects in furnished houses should be understood. A good many years ago, it was decided that when a house is let furnished, there is an implied condition in the agreement that the house is fit for occupation on the day on which the tenancy begins. That case arose out of a house being infested by bugs, and though it has frequently been discussed in recent years, the main principle as applied to furnished houses and lodgings, as distinguished from unfurnished houses, has never been disputed. But it should be borne in mind that it does not refer to any houses except furnished ones, and therefore a tenant who takes an unfurnished house and finds it unfit for habitation on account of sanitary defects has no remedy against the landlord unless he or his agent has represented that it was in a fit condition for habitation. Whether this state of the law does not conduce to bad drainage and defects, is more than doubtful, but it cannot now be changed except by some legislative enactment. In the year 1876, the "famous bug case," as it is styled, was succeeded by one which may not inappropriately be called the famous drainage case, in which the same principle was still further strengthened, since the judgment of the presiding judge concluded with these words,—"It is an implied condition in all hirings, *i.e.* of a furnished house, that the house shall be in good and tenantable condition, reasonably fit for human habitation and for comfortable habitation, and from the very day on which the tenant is to enter down to the very day on which the tenancy is to cease, otherwise the tenant has not what he has contracted for." These are words which might well be hung text-like over every house-agent's desk, and it would be well if these persons would always impress them on their clients. The actual case in which this judgment was delivered does not need minute consideration; it is sufficient to state, as exemplifying the reckless way in which persons make assertions, that the agent stated by letter that the owner of the house "believes the drainage to be in perfect order, as she is very particular herself on this point, and there has been no infectious illness of any kind in the house." As soon as the tenant arrived, a disagreeable smell was perceived, and on examination it was found that there was a cesspool full of filth in the butler's pantry within 2 in. of the floor!

It is obvious that a house in such a state was not reasonably fit for human habitation; therefore, that the principle which we have already mentioned applied. Some amusement appears to have been caused in court during the latest case of reference to a single and solitary bug, and though this may seem trifling, it is clear that, in a rather comic form, it exemplifies a principle. To prevent a house being habitable it is not enough that some slight inconvenience should be caused to the tenant; his enjoyment and comfort must be materially interfered with. Some persons may have crotchets as to ventilation, but because a house is not supplied with some particular system it does not follow that the house is not, in general opinion, fit for habitation, though in the view of this particular person it may be unfit. It is often said that the word "reasonable" or "reasonably" is too vague, but, in fact, it guards against individual caprice, and it answers to an expression which

would state, in so many words, that a house or a thing is to be in a certain condition, the test of which is the opinion of a fair number of ordinary persons. "Reasonably fit" means, in fact, that it is fit in the opinion of average persons. When, however, it comes to be considered that sanitary principles are now much more understood, it must be obvious that the average opinion will now expect a furnished house to be in better condition sanitarily than would have been required some years ago. Let any one remember how few houses, not many years ago, had absolutely no system of drainage-ventilation connected with them, and how, in the opinion not only of sanitary reformers, but of most intelligent householders, some such system is now considered essential to a healthy house; and then, if the principle we have mentioned be also borne in mind, it is obvious that its recollection should make all owners of furnished houses most particular as to the sanitary state of their residences. Because no disagreeable smells are at once perceived, it does not follow that a house is in a wholesome state, and we should be much inclined to say that if a tenant took a house which had no drainage-ventilation, a special jury in London would be much inclined to say that it was not reasonably fit for habitation. Therefore, not only for the sake of the general health of the community, but for the sake of their own pockets, every owner of a house, whether in town or country, should see that it is in the best sanitary condition, otherwise when it comes to be let furnished he may find himself tenant-less, rentless, and embarked in litigation. We can only regret that the principle we have been touching on in these remarks does not apply to unfurnished houses, and so prevent not a little bad building.

"ON SUNDRY WORKING DRAWINGS." *

When I was asked to read a paper to this Association I did not like to refuse, and yet I felt that I really had but little to say beyond what I have already said at one time or another in these rooms, either with regard to the general principles or the practice of the art of architecture. It is true that a very tempting list of subjects suitable for architectural essays was kindly submitted to me by your officers, from which I might have selected a theme whereon to discourse; but I thought that the task of working up the necessary materials for such a lecture might fairly be left to some of the rising younger men in the profession, who have both more time and ambition for such a purpose than I now have. It struck me, however, that there must be, or at least ought to be, stored in the folios and memory of one who has been so long in architectural practice as I have been, drawings and incidents which, though doomed to ultimate and speedy oblivion, might be temporarily revived for the advantage of his younger brethren upon such an occasion as this. I chose, therefore, the title of "Sundry Working Drawings" simply as a convenient peg whereon to hang, as it were, some gossip which might suffice to occupy one of the evenings of your session. If this should prove, as I cannot but fear it will, to be of questionable taste, as partaking somewhat too much of an egotistical nature, I still venture to hope that, though it may lay me open to censure on that account, it may not be altogether a waste of your time and attention to listen to it. Should I not have been entirely mistaken as to this idea, it is possible that my effort may serve as a hint to other architects, whose stores and reminiscences are of greater value than mine, and lead them to follow my example. Then, if such could be induced to look over the contents of their shelves, and to dip into the pages of their diaries, and extract thence, for the benefit of their juniors, some of the details and particulars of their professional experience of greater value for instruction than mine can pretend to have, I shall feel more than rewarded for the little trouble that the preparation of this paper has cost me.

"Working drawings" being the nominal subject that I have now to deal with, I shall commence by making some few remarks upon their features and characteristics. Working drawings may be subdivided into what may be termed, for the sake of distinction, general working drawings and detail working drawings. The former of these are usually drawn to the scale of one-eighth of an inch to a foot, except in cases in which the buildings are very extensive, when the scale of one-sixteenth of an inch to a foot is frequently used. Neither one nor the other of these scales, however, is, in my opinion, the best adapted to set off to advantage a design, the detail of which is of a character at all elaborate. Then the scale of one quarter of an inch to a foot is altogether too large for general working drawings, and it makes the drawings quite too cumbersome in size. In my opinion the scale of three-sixteenths of an inch to a foot is the one which gives the best effect for such general drawings as it may be thought worth while to take some exceptional pains with, although it is true that it is somewhat troublesome, and is objected to by builders on account of its being unusual. For detail working drawings the scale of one-half inch to a foot is the one that is the most suitable for brickwork and stonework, and that of an inch to a foot for woodwork generally; but for roofs, and suchlike designs in wood of large size, the half-inch scale will suffice. Mouldings and the like should, however, be always drawn out full-size; as it is not safe to allow workmen to enlarge them for themselves from drawings to smaller scales, there being considerable risk of the delicacy and essential features becoming more or less spoiled during the process.

The term "working drawings" distinguishes those which are intended to direct the actual execution of the work from either probationary drawings, for which less accuracy and more artistic effect is necessary, or from drawings of executed work, such as may have to be done by students for exercise or in competition for medals and prizes. The minute and painstaking character expected in the latter cannot be maintained in ordinary actual practice. For working drawings, therefore, the primary essential is clearness rather than technical excellence or beauty of draughtsmanship. For this reason the representation of shadows is to be avoided in them, and I need hardly say that backlining, once so fashionable, and which is but an affectation of proper shadowing, is quite inadmissible. Colouring to working drawing should be used simply for the purpose of distinguishing the different materials, and the same colours should always be used for the same materials. The printing and writing should be distinctly legible, though, of course, it is desirable that it should at the same time be somewhat characteristic.

Economy in the preparation of working drawings is a most important point for consideration, both as regards the labour and cost. For though an architect is only supposed, according to the regulations for professional custom of the Institute of Architects, to be obliged to supply one set of drawings and one set of tracings, these fall far short of the usual demands in practice; nor is it often, according to my experience, politic, if possible, to seek or obtain additional remuneration for further copies, although fairly chargeable. My own custom in this respect is to keep my working drawings in pencil, so that I may be able at any time to make any alterations required therein. From these pencil drawings I have tracings made, in strong black ink, upon white tracing-paper, whence other copies may be taken and multiplied by means of photo-lithography. I am thus enabled, at a comparatively small expense, to supply as many sets of the working drawings as may be called for by employers, surveyors, builders, or societies. By the same means also, especially in the case of old buildings destroyed, restored, or altered, the folios of the Institute and this Association may and should be enriched.

It is upon the character of his working drawings, rather than upon that of his preliminary sketches, valuable as an able and artistic treatment of those undoubtedly is, that the ultimate reputation of an architect depends. It is those only that actually affect the work itself. Upon the clearness and accuracy of the working drawings alone do the employer's interests and immunity from disputes and extra charges depend, so that they require, and should receive, all the care and attention that can be bestowed upon them. Doubtless, therefore, you have often determined that, come what will, these at least should have your own personal work, and that they should represent you, as it were, and all that is in you, and that their study and completion should precede the execution of the contract. But, alas! man proposes, but fate and circumstances too often dispose otherwise, and you frequently find to your disappointment and regret that, after complete and elaborate sets of both general and detail working drawings have been prepared, it has proved that it has only been to be set aside in consequence of some change of purpose, with or without reason, on the part of your employers, and then that the whole work has to be done over again. You thus get to learn by experience that circumstances compel some compromise between the perfection of working drawings that you would yourself desire, and such comparative imperfection as may just suffice to secure the work being properly carried out. This, it need hardly be said, will not reach that standard of excellence which is so often attained by the student competitors for the medals and prizes of the Institute and this Association. Sometimes, instead of letting the preparation of the detail working drawings follow that of the general ones, so as to be simply explanatory thereof, I reverse the process, making my designs at once, after mere preliminary sketches, to the scale of ½ in. to a foot. This plan reduces the working-out of the smaller-scale general drawings completely to a mere mechanical operation, so that it can be done without any personal supervision on my part, and yet with certainty that the character intended for the detail will be preserved throughout. By this means my own time and attention is able to be concentrated upon those parts of the work which alone demand thought and design, the rest being left to be done entirely by others. I was able by this means, in the case of the competition for the Law Courts, to dispense with any increase of my staff, and not to disarrange at all my ordinary practice, whereas I remember to have heard almost all my competitors complain of having suffered severely in both those respects.

It is time now to descend from generalities and to speak of particulars, and I think that the most convenient way of arranging the matters I propose to bring before you will be in what may be termed brief, isolated, autobiographical passages, placed in chronological order, which will admit of occasional divergence as subjects appear to suggest themselves. My excuse for these must be that in reality an architect's life is represented in his works, and his works constitute all that in his life is worth any record at all.

Most of my early professional experience was obtained in the diocese of Llandaff, in connexion with its diocesan work. In the year 1851, the period of my apprenticeship to Professor Donaldson having expired, I spent three months in a rapid sketching tour upon the Continent, in companionship with the late Mr. Thomas Hill. Immediately after my return I was fortunate enough to receive a commission to build an hotel at Southerndown, a small watering-place on the coast of South Wales, near Bridgend, in Glamorganshire. After my first visit to that neighbourhood to inspect the site, I stopped on my way homewards to see the cathedral at Llandaff, which was just then emerging from the condition of ruin and spoliation in which it had lain, in picturesque confusion, ever since Mr. Wood's unfortunate effort to convert it into the semblance of one of his favourite assembly-rooms of his own town of Bath had happily been but partially carried out. I was then courteously shown over the works in progress by Mr. John Prichard, the diocesan architect, under whose immediate charge they were. Shortly afterwards I received an invitation from that gentleman to join him in partnership, an offer which I accepted, and this led to my going down to reside with him at Llandaff. The cathedral of that little city (which is in fact only a suburban village in the neighbourhood of the town of Cardiff), with its lovely and refined Early English proportions and detail, thus became my constant study and source of inspiration. Its beautiful western front in particular, the exterior and interior of which form two distinct compositions in perfect harmony the one with the other, roofless and festooned with ivy when I first knew it, seemed, as it still seems, to me to be a model for graceful proportion and refined treatment of mouldings. I quite revelled in its loveliness, thinking it to be one of the choicest examples of that style which England has made specially its own, and of which it may be fairly more proud than of any of the others which it shares in common with other countries of Christendom. The carved foliage of the interior of the cathedral was to me a continual source of delight. It is most

* From a paper by Mr. J. P. Seddon, read before the Architectural Association on the 24th ult., as elsewhere mentioned.

sparingly used, as if it were jewel-work; and indeed it is as precious as if it were so. It is of the finest type of Early English foliage, the flow of the lines of which have remarkable grace and freedom; the stems are clear and vigorous, and the trefoil-shaped leaves are excellent in outline and surface modelling. I sent up a collection of casts taken from them to the Architectural Museum, and there is nothing to my mind among their treasures to surpass or even to equal them. This carved foliage of Llandaff is, in my opinion, the perfection of that particular class of work which is seen in its very earliest stage, budding out as it were of the simple Norman cushionwork of the capitals of St. David's Cathedral, and which is to be found revelling in its richest and wildest profusion in that of Wells, but nowhere with such developed fulness and power, and yet with refinement and constraint, as at Llandaff. Very noticeable also are the simple but noble piers of the main arches, with their alternately wide chamfers and groups of triple shafts. The effect of these piers is not improved by the access of richness that is seen in those which have been imported into the church of Llanidloes, in Montgomeryshire, which has just been restored by Mr. Street. They were removed from the now destroyed but once marvellous Abbey of Curn Hir, in the same county, the number of arches in the main arcades of which are said to have reached the unprecedented number of twenty in succession. In these piers the tripled group of shafts occur on each face of their octagonal piers, and their capitals are all united in one rich band of foliage of the character of which we are speaking, but of inferior excellence to that of Llandaff.

The ordinary diocesan work, in which I became at once fully occupied, consisted largely of church restorations, and to my share fell principally those works which were situated in the archdeaconry of Monmouth, under the able and vigorous direction of its energetic archdeacon, whose habit it was to map out his district, and to appoint a visitation to various churches, the dilapidated condition of which required immediate attention, and to take me with him on those occasions. Upon our reaching one of these, possibly some few minutes later than it had been intended, he would first ask me to note its deplorable state, which I could not but admit was tolerably obvious. He would then inquire of me what could be done with it, premising, however, that there was no money to be found. To this problem I would reply that its solution and the course to be pursued were far less clear. Nothing daunted, he would then explain to the assembled vicar and churchwardens that he had brought me there simply in my capacity of diocesan architect; which meant that they might set their minds at ease, for the present at any rate, on the subject of fees; but that, as I happened to be there, I might as well take the plans and particulars of the church, so that, in case I should be sent for upon some future occasion, I might be prepared. He would then allot me about half an hour, proffering me his own assistance, when wanted, as a tape-holder. Under such pressure I soon learned to systematise proceedings, first sketching in succession the plans, elevations, sections and details, and then noting down the necessary dimensions; having done this, we proceeded to perform the same task at the next church upon our list. On my return home I plotted out these several sketches, and though, of course, when actual work was contemplated at any of these places, it became necessary, perhaps, to make another and more careful survey, much time had been saved, and the opportunity given for preliminary consultations.

There are now so many different theories on the subject of restoration that I cannot hope to have satisfied all. Mine, then, was to replace matters as nearly as possible as I found them; and I have considered it a compliment when I have been told, as I was by the late Sir John Harding, in connexion with the restoration of Rockfield Church, in Monmouthshire, that had he not been informed he should not have known that anything had been done to it. I was but recently told, however, by a zealous member of the Society for the Protection of Ancient Buildings, that I am only one of the more destructive members of my craft in consequence of the confusion thus wrought for future archæologists. There are, in truth, so many and grave questions that continually arise in dealing with old buildings, and so many ways in which each of these may be viewed, that an architect's position in relation to such matters is a difficult one. He has to decide what should be done, and that with the certainty that, whatever his decision may be, it will please few and be disputed by some. His only consolation is, that if his censors be asked how they would have acted under the circumstances, they would either have done nothing, which he was not in a position to do, or that each would have done something different to the rest; so that, therefore, their criticisms neutralise one another. In self-defence I can certainly aver that these village churches then stood, as it were, on their last legs, and that the newly-arisen zeal of the Church would not brook their total loss. After all, an architect is but the servant of the public, and though he may be able to (and, if so, should) influence the opinion of his employers, he is bound to defer to that in the end.*

CORNISH CHURCHES.

ST. PAUL'S ECCLESIOLOGICAL SOCIETY.

At the meeting of St. Paul's Ecclesiological Society, on the 22nd ult., the Rev. H. C. Shuttleworth, M.A., Minor Canon of St. Paul's, read an extremely interesting paper (full of quaint legends and amusing stories), entitled "Stray Notes on some of the Churches of Cornwall." A supplementary paper on the same subject was also read by Mr. J. D. Sedding, architect. We print the substance of both papers.

Canon Shuttleworth observed that generally speaking, the churches of Cornwall were not rich in architectural beauty. The county had always been poor and sparsely populated, and the fierce Atlantic gales, impregnated with salt, swept over the hills and up the narrow valleys with a force which demanded solidity and strength on the part of the buildings, rather than elaborate ornament. The native stone, moreover, was mainly slate and granite, neither of which lent itself very readily to decorative treatment. It was somewhat strange that the beautiful Serpentine stone of the Lizard district had not been more largely used for ornamental work inside the churches of the county. Some kinds of the native granite, also, if sufficient skill and expense were forthcoming, could be worked up into very handsome decoration. The Cornish churches were all of the same character; with few exceptions they were uniformly low, rather flat in the pitch of the roof, and without buttresses, thus giving an effect of long plain lines. Chancels were not the general rule; the larger churches had a nave and one aisle, equal in length, with perhaps a transept, and always a porch on the south side. Almost all of the Cornish churches were rebuilt in the fifteenth century, when a great wave of church building seemed to have passed over the county; and almost all of them, therefore, had the same general features, of which those of the Church of Egloshayle might be taken as examples. The west portion of the nave was evidently the original church, and the north wall contained much of the old work, including two beautiful Early English lancet windows of two lights. The remainder of the nave, the south aisle, with its long array of windows, and the tower, were of the date of the re-building, and were therefore Perpendicular in style. The transept would seem to have been left unfinished, and was probably treated by another and a later hand, for it proclaimed itself debased. Egloshayle Church,—the dedication was lost, but the name signified "the church by the river or estuary,"—was remarkable as possessing a very fine old stone pulpit, probably the gift of a certain munificent vicar named Loveybond, who built the noble tower at his own cost, and the bridge from which the neighbouring town had its name. In this it was unlike its neighbours, but like them in the long row of granite pillars and arches between nave and aisle, the granite mullions of the many large windows, and the magnificent tower-arch looking up the long vista of the nave. This was the usual type of Cornish churches of the smaller kind; the larger had two aisles along the whole length of the nave, of which Bodmin and St. Kew,—the latter church having a structural chancel,—might serve as examples. In common with most others, Egloshayle Church had a wagon or cradle roof to nave and aisle, with bosses curiously and richly carved. The roof of the nave, however, was found to be so rotten when the church was restored a few years ago, that an open wooden roof was substituted. The old wagon-roof remains, however, in the south aisle. Indeed, the Cornish churches must at one time have possessed rare store of finely-carved wood-work. The bench-ends of the old seats in this church were covered with singularly-bold carving, in what an experienced London worker in old oak declared were the finest pieces of wood that had passed through his hands. There were also abundant remains of old screen-work, some of it very rich and good. But, alas! much of this kind of work, here and elsewhere in the county, had disappeared under the despoiling hand of the churchwarden of old. It was no uncommon thing to find farm-buildings repaired, and even pigsties patched, with fragments of old oak carving, upon which, in centuries gone by, some cunning workman had lavished his consecrated skill, for the glory of God. Most Cornish churches possessed towers, of a plain and massive character. The tower of Egloshayle Church was very lofty, from the fact that it stands in a valley, or "bottom," as Cornishmen said. Churches built upon the bleak hills had their towers necessarily low, and of great strength and thickness. On the north coast of the county, upon which the Atlantic gales broke with all their force, a line of church towers, like a row of grey weather-beaten watchers, stood along the loftiest and most seaward range of hills, looking over the ocean on one side and the outspread western county on the other. They still served the purpose for which, probably, they were erected there,—that of acting as landmarks and beacons to passing ships. Spires were rare in Cornwall, and when they did occur, it was always near the coast. A few of the churches of the county had no towers of their own, but only a detached bell-tower on the nearest hill. Mylor, a church near Falmouth, was an example in point, and, like every other church which possessed this feature, it stood in the bottom of a valley. A very few of the Cornish towers were rich in design and ornament: that of Truro, for example, and the far-famed tower of Probus, not far off it. This tower was very like that of Magdalen College, Oxford, and of almost equal beauty. Its style was the purest and most perfect Late Perpendicular, though it was built in the reign of Elizabeth. It was 125 ft. high, of granite, carved in every part. Such were some of the most marked general characteristic features of the Cornish churches, most of them resulting from the climate, the position of the county, and the character of the local stone and wood. If, so far, nothing very unusual had been touched upon, it was right to say that Cornwall did possess some few ecclesiastical buildings and remains which were highly unusual, and even unique; for example, only in Cornwall, so far as the lecturer knew, could be found authentic remains of the very earliest period of church architecture in England. The western county was evangelised in the fifth, sixth, and seventh centuries after Christ by Irish missionaries. They landed on the northern coast, chose their vantage-ground, and there built themselves a cell and an oratory hard by. The tiny oratory became a church, in which the remains of the missionary were usually buried. One, at least, of these ancient oratories still existed, though, unhappily, in ruins,—the Church of St. Piran, at Perranzabuloe, about eight miles from Truro. This church was buried for ten centuries under the shifting sand, and had only lately been exposed to view,—and to destruction, for the hand of man had been more unsparing than the sand, and the little building had been despoiled and mutilated, until it became a disappointment and a sorrow to see it. Piran was consecrated by St. Patrick,—so ran the tradition,—at the end of the fourth century, the saint having crossed the Irish Channel on a millstone, and landed near St. Ives. At some unknown date St. Piran's Church was submerged by the shifting sand, and lost to human sight. Another church was built, as near as possible to St. Piran's grave, and care was taken to choose the site upon a spot where a stream of running water formed an insurmountable barrier to the advancing sand. This second church was rebuilt during the great era of church-building in Cornwall (the fifteenth century), and the tradition of the buried sanctuary had never been lost. The guardian stream, however, was diverted by

* To be continued. See p. 727, &c., present number, for some of the drawings, with particulars, used to illustrate the paper.

some mining works, and Borlase, writing in the last century, said then that the church was in no small danger from the insatiable sand. In 1803 it was dismantled, partly taken down, and a new church built two miles away. Thirty-two years later the sand shifted once again, and the old oratory, buried for 1,000 years, came to light again. It lies due east and west, and it is 29 ft. long by 16 ft. 6 in. broad. The entrance was on the south side, through a small arched doorway of the rudest construction, with a curious moulding above, of a character probably older than either Norman or Saxon work. Three heads, roughly carved in stone, found above the moulding, were now in the Truro Museum, but they were said to be much later in date than the rest of the building. The floor was below the level of the ground outside, and was reached by three steps. A window flanked the south door; over the altar was a rude east window. The stones used in the construction were slate and granite; no lime had been used, but sand and native china clay. The floor was of concrete. The stone altar-slab was still in its place, and beneath it it were found three skeletons. The lecturer said he was ashamed to say that the British Philistine had chipped, hacked, and stolen from this time-honoured relic. The most remarkable of the remains were now in the Truro Museum. With St. Piran's Church might be compared the Chapel of St. Enedoc, in the parish of St. Minver. "St. Enedoc" was probably a corruption of St. Guinedoc, and, oddly enough, the popular name of "Sinkineddy" had preserved the true etymology. Like St. Piran's, this little church was built in the sand-hills, about 1430, when it took the place of an ancient oratory, traces of which appeared in 1822 through the shifting of the sands. The lecturer remembered St. Enedoc in its unrestored condition, when the sand was higher than the roof of the chapel, but now it had been well restored, and the shifting of the sand prevented by the planting of grass and reeds. It had a Norman font, also the base of a fine carved oak screen of Third Pointed work. Besides these ancient oratories, Cornwall possessed unique ecclesiastical remains in the wealth of wayside crosses, which stood in all manner of places,—in churchyards, by the roadside, at the meeting of many ways, on lonely and untrodden moors and hills. Many were doubtless still in their original sites, where they were raised to fix the boundaries of church property, to guide the wayfarer to church or religious house, or to mark the scene of some memorable event, some sanguinary slaughter, or of some missionary's preaching of the gospel of love and peace. They were older, for the most part, than Athelstan's conquest of Cornwall in 936. Almost all were of granite, but they varied *ad infinitum* in size and shape. One type was that of the Greek cross,—four short limbs of equal length, sometimes carved on a circular disc, sometimes with the spaces between the arms pierced with holes. Near the Land's End, the crosses were raised on steps, and often sculptured with a rude figure of the crucified. In the east of Cornwall they were usually very high, enriched with scroll-work and mouldings on the shaft. Resuming his remarks on the churches of the county, the lecturer observed that St. Germans Church was of high interest, as the ancient seat of the Cornish bishopric from the time when it was established under Athelstan. The church is situated in the park of the Earl of St. Germans, Port Eliot, and has the unusual feature of two western towers, overgrown with ivy and fern. There is a nave and a south aisle, and the church had formerly a chancel, which fell, with part of the nave, in 1792, when the north aisle was taken down. Between the towers is a deep central doorway of Late Norman type, richly ornamented. The north tower is Norman in the two lower stages, but the upper stage, which is octagonal, and rather recalls the lantern of Ely, is Early English. The south tower is Norman below and Perpendicular above, and the church has further Norman remains in the font and two piers of the nave. The remainder of the nave is Early Perpendicular, and has a very fine east window of five lights. Between this and the east window of the south aisle is a striking feature which is called the bishop's throne, but which, in all likelihood, was merely a niche for a saint's image. This church has much interesting old carving, in particular, a *miserere* stall representing a man carrying a hare on a stick over his shoulders, with dogs in couples,—said to be oldest piece of carving in the West. Passing from St. Germans to Bodmin,—from the old cathedral to that which had claimed to be the new one,—the lecturer remarked that Bodmin Church was the largest in Cornwall. Notwithstanding this, and that Bodmin was supposed to be the county town, it was matter of congratulation that Truro had been fixed upon as the seat of the new see, for a more dead-alive place than Bodmin could nowhere be found, as might be inferred from the old Cornish saying,—"Into Bodmin and out of the world." Bodmin Church, dedicated to St. Petrock, was thought by some to be monastic and parochial, but Sir John Maclean maintained, with good show of reason, that the priory church was distinct. Among other churches referred to by the lecturer were St. Niot's, near Liskeard, with its interesting series of old windows; Temple Church, extra-parochial, formerly a chapel of the Templars, and latterly known as the "Gretna Green of England"; St. Columb, a large and beautiful Early Decorated structure; Mawgan, with its fine Perpendicular tower and early brasses; and Forrabury, with its remains of Saxon work.

Mr. Sedding, in his paper, said,—Cornish churches are what outsiders would call "mean" edifices. They are of small proportions, and low, and very much like one another, and they would be generally considered to be deficient in architectural interest, both on account of similarity of type and detail. There are many points of similarity between the churches of Devon and Cornwall, and as Devonshire churches partake of many of the characteristics of Somersetshire churches we may say that so far as the *genus* is concerned, the work of the three counties is allied. But if they had to be classified in order of architectural merit, they would have to stand thus: Cornwall good, Devon better, Somerset best. Devon echoes Somerset; Cornwall echoes Devon. Cradle-roofs abound in all three counties. In Cornwall there is no other type of roof. In Devonshire the generality are of that type. In Somerset there are a great number of that type, but a great variety of other types also. So, there is the same peculiarity of aisles continued to full extent of the chancel, the aisles having pitched roofs of the same description as the nave, but somewhat smaller. This accounts for the absence of clearstory windows: I know of only Callington, Lostwithiel, Fowey, and North Petherwin. Again, in Devon and Cornwall there is an absence of any architectural distinction or break at the chancel. I know of only three cases with chancel arches, at Tavistock, Bodmin, and North-hill (and the latter was removed about fifty years ago for safety's sake, but responds of the corresponding arch in the north arch are still visible). In each case the responds to arches die up near the roof, while the arches themselves are scarcely visible, as they almost merge in the roofs. I have said that the architecture of the three western counties is of the same genus, but it would be wrong to suppose that the work of each county had not its own peculiarities and distinctive characteristics. Any one familiar with them soon finds these differences out, and is able to mark how strongly local types and local tricks of method prevail. Cornwall is a remote place, and remoteness in the Middle Ages implied inaccessibility. It was not only remote, but it was little known and visited, for it is strange to note how few large Mediæval houses of any pretensions exist in the county. This remoteness and isolation were, of course, favourable to the growth of individuality of character. The builders had no one to please but themselves, and as neither the coach nor the railway was running then, there was little chance of their traditional types being interfered with, or of their seeing work in other parts of England which would put them out of conceit with their own. The earlier periods of Mediæval architecture are but sparsely illustrated. The remains of Norman work are not numerous. There are two bays of a Norman arcade at Lelant; there are also portions of Norman arcades at St. Germans, North Petherwin, and St. Breward; and other Norman remains at Manaccan, St. Cleer, Tintagel, Mylor, and Landwednack. Early English work is rare. St. Anthony's, near Falmouth, is said to be the best example. I have met with several cases, such as St. Levan, Newlyn East, and St. Wendron, where one or more of the transepts of a thirteenth-century church have been left standing, whilst the rest of the structure was destroyed by builders of a later date. The Decorated work which remains is of a high character, as at South Hill, Sheviocke, St. Ives, near Liskeard, North Hill, St. Thomas's Chapel at Bodmin, St. Columb, St. Austell, and Lostwithiel. The stone employed in work of early date is Polyphant or Cataclose stone. The prevailing type of the architecture of Cornwall is of various stages of the fifteenth century. One of the most interesting phases of Cornish work is that which was done in the early part of the sixteenth century. This period is represented at the Church of St. Mary Magdalen, Launceston, and at St. Mary's, Truro, which are remarkable for their elaborate external panelling,—that at the former is done in granite, and that at the latter in Pentuan stone. The tower at Probus, which is, without exception, the finest in Cornwall, is also of this date (1530). Its rival for eminence is Fowey, 100 ft. high. Probus is 125 ft. high, and infinitely more elaborate, and it is interesting to note how closely it resembles a Somersetshire type. In the churches of Perpendicular date granite is, almost without exception, employed for window tracery; and in the later work, where dignity of effect was considered, and funds and stone plentiful, the structures were faced with wrought stone entirely, as at Probus Tower, North Hill (south aisle), and the Launceston and Truro churches, which are covered over with sculptured devices. To the sixteenth century is also to be ascribed the noble series of stained-glass windows at St. Niot's, which dates from 1528. To the sixteenth century is due also most of the fine woodwork in the county, as the seats at Altarnum, St. Levan, Morwenstow, and in the Buryan, Sancreed, and other screens. The peculiarity of Cornish wood-work is in the profuseness of its surface ornament. There is nothing like it out of the county, anywhere, to my knowledge, except the superb screen at Swymbridge, North Devon. Ordinarily the panels of even the most ornate screens in other counties will have traceried heads, but plain panels. Here the panels are all covered with sculptured devices,—sometimes of foliage alone, of great varieties of type,—growing mostly out of quaint little pots; or foliage mixed with birds or beasts, tortured griffins, and all manner of queer imaginative creatures and religious emblems, and here and there figures of men or angels,—and not only respectable men and men of high degree and the patrons of the church, but in some cases the village clown, the squire's tame bear, and the "passen's" pig. And many is the caricature of Tom, Dick, or Harry, and many the piece of friendly fun or naughty spite that appears in these carvings, which testify to the deft handiwork and keen humour and quaint imaginations of the Cornish craftsmen of by-gone days. The history of the grotesque in Cornish art ought certainly to be written. I have often tried to analyse for myself the sources of the peculiar delight one gets from an old Cornish church, but as often as I have tried I have given it up. One cannot put that sort of thing into words. There is, as I have said, very little to admire in the rough exterior of the churches of the county, or in their unvaried outlines, or their unpretending features, and little variety of plan and type; and the unsympathetic stranger, coming upon them with his mind stored with taller memories, would think them mean and rude and deficient in interest. Yet to me they are always full of a peculiar, inexpressible charm. Somehow they seem more identified with the local surroundings than is the case with the church architecture in other parts of England,—possibly because the surroundings are themselves usually of so striking a character, and because their builders actually, in many cases, merged the churches into the hill sides by building them "into the country," as the Cornish folk say. But these simple structures seem somehow to be part of the simple Nature of the moor and down which surround them; they have what painters call "quality" or tone in them; they are essentially human, and eloquent of the character of the men who reared them, and they are full of the silent poetry of an art that was religious and human, and that dedicated its best to the service of the great God.

A brief discussion ensued, in which the Chairman (the Rev. Dr. Sparrow Simpson) and Messrs. Somers Clarke, S. W. Kershaw, the Rev. Mr. Acland, and Major Heales took part, the thanks of the meeting being heartily accorded to Canon Shuttleworth and Mr. Sedding for their papers.

DAMP WALLS.

IN a recent issue of the *Badische Gewerbe-Zeitung* appears an article on this subject, the importance of which induces us to reproduce it in our columns, with such additions and remarks as seem to us desirable. The writer, Professor Meidinger, observes that, if in an old house wall-paper turns mouldy and peels off, the cause is dampness in the walls. The walls of an old house may turn damp from various causes:—

1. The rain sickers through a defective roof into the wall, or it penetrates a badly-pointed wall.

2. In the cold season vapour produced from special causes is deposited on cold walls.

3. The wall contains aphronitre (nitrate of lime. Chloride of calcium, which occurs less frequently, displays the same behaviour; quarry-stones which remain wet contain probably one of these salts). The wetting of walls in consequence of the presence of hygroscopic salts is caused only rarely by the formation of saltpetre; most frequently sulphates of sodium, and especially of magnesia, show themselves, which are contained either in the mortar or in the bricks. Mortar of dolomitic limestone, which has been burned with fuel containing sulphur, especially has caused very frequently to the formation of wet places. Even the presence of sulphuric acid in a damp atmosphere, in districts where much coal is consumed, has given rise to the formation of sulphate of magnesia in quarry-stones, and consequent damp walls, as was proved some time ago in London on façades of limestone containing magnesia (Portland stone).

4. The underground water reaches so high that it rises in the wall of the basement.

5. The house is built on a slope, so that the rain-water running down enters the wall of the basement.

Firstly. The cause of the dampness named first may be removed by repairing the roof, or by repointing the wall. A coating with oil paint of the outer face of the wall may also be recommended in certain cases. If the outer walls consist of timber and bricks, which cannot be joined closely, the method adopted, especially in mountainous districts, is very serviceable; that is to say, of covering in the walls of the weather-side with boards or shingles, and for greater durability painting the latter in oil. On the Lower Rhine, slate, as used for roofs, is also employed. A cover with metallic slates is likewise to be recommended, and quite recently pressed plates have been used which have the character of shingles. All perfectly water-tight coatings and coverings on vertical surfaces of course keep off driving rains, and prevent the accumulation of dust and the growth of moss and lichen; but they form, at the same time, an impermeable layer, arresting ventilation through the walls, on which account they may prove injurious to health, under certain conditions, in overcrowded houses not provided with artificial ventilation. The duration of such coatings and coverings likewise is not very great, for oil varnish becomes gradually humid, liable to form emulsions with water, and, when in that state, persistently retains damp, which penetrates also into the interior of the wall. It is evident that walls already damp cannot be dried by such means; that, on the contrary, their drying is prevented. On the other hand, the shingle walls in use in Switzerland, or the protective walls of Solingen plates employed in the country along the Weser, and the plates used on the Rauhe Alb in Würtemberg, besides the slate coverings, are quite to the purpose.

Secondly. The precipitation of damp and water on cold walls is observed principally in kitchens and in large rooms filled on occasions by large assemblages. In the former case, the deposition of damp arises from the steam generated in cooking; in the latter, it is caused by the breath of the people collected together. If the walls are painted with oil colour, drops of water are formed which collect on the walls, and in some cases even wet the floor. If the walls are coated with size-colour, the water penetrates and makes them darker; as soon as the generation of steam is arrested for a time, they become perfectly dry again. If the walls are papered, the paper-hangings become wet and dark, to dry, however, again very soon and completely. The paper does not turn mouldy, but the paste will probably be destroyed in course of time, and the paper itself discoloured. Under such conditions, the outer walls are chiefly exposed to the precipitation of water, especially if they are built of quarry-stones, which are good conductors of heat. Brick walls are less exposed to such a deposition, and walls of tufa and wood not at all. If it is intended to protect an outer wall exposed to such precipitations, the simplest way is to board it. The boards, of a thickness of 0·4 in., are nailed to flat beading $\frac{3}{4}$ in. to 1·1 in. thick, and secured with holdfasts to the wall, the intervening space being filled with straw. Thus a very bad conductor of heat is placed nearest the wall, upon which water will not be deposited. The warming of the room is also greatly facilitated by this means; for this reason, such a covering may be recommended in many cases, but especially for north or east walls, and more particularly for bedrooms. The boards are either covered with shirting, upon which the paper may be hung, or they are nailed with reeds (much used in place of laths in Germany) and plastered with gypsum, after which the wall may be treated in any manner desired. The cost of such a boarding is in Germany about 1s. per square yard, the shirting 7d., the reed and gypsum coating 1s. 5d.

Thirdly. Aphronitre is most frequently the cause of permanently wet walls, or such as become always wet in damp weather. It is observed principally in the lower stories. Its origin is due to organic substances containing nitrogen, especially exhalations of man and animals, which lodge in the walls and form nitric acid during their decomposition; the latter, in combining with lime, forms nitrate of lime. Its appearance is therefore most frequently met with in water-closets, in stables, and in the country very often on walls near accumulations of liquid manure. Nitrate of lime is a soluble salt (it is hygroscopic); that is, it absorbs water from the atmosphere, more or less according to the humidity of the air. In dry weather part of the water absorbed during damp weather passes back into the atmosphere. If a wall contains little saltpetre, it becomes light in colour and dries in dry weather; during damp weather, on the contrary, it turns dark and wet. Should the wall contain much saltpetre, the wall is permanently wet, as in stables. Paperhangings on a wall containing saltpetre appear dark during damp weather, and may easily be pulled off. The paste, kept damp for some time, gradually decomposes, and thus loses its adhesive property, the paper hangs loosely even in dry weather, and is held in its place only at the permanently dry spots. The adhesive ingredients of colours are likewise destroyed, the colours fall off as dnst, mould is formed, and the whole appearance is totally deteriorated. The aphronitre possesses the property of spreading to a certain distance from the spot where it originates over the porous wall, through stone and mortar. It thus penetrates the whole thickness of the wall, and arrives, although generally found only on one side, at the other surface of the wall. Quite apart from its ugly appearance, a damp wall possesses other disagreeable properties. The adhesive ingredients of paper and colour develop an unpleasant odour during their decomposition; the same is observed in mouldy paperhangings, and in the timber in contact with damp walls. Effects injurious to health have consequently been often attributed to damp walls, although it would be difficult to prove such an assertion. Various means have been proposed for preventing damp in walls from aphronitre, or at least obviating the disagreeable consequences attendant upon its formation. We select some of the principal means suggested.

(*a.*) The evil cannot be remedied by simply removing the mortar coating, as far as it shows damp, even between the stones, and subsequent fresh plastering. After the mortar has become thoroughly hardened and dry, the wet places appear again after a little time during damp weather, although not quite so large as before. The saltpetre still in and between the stones gradually penetrates part of the new plaster, until it shows itself on the outside. There is no doubt that, even after removing this second plastering and putting on a third, the latter would show wet places, although of smaller dimensions. It might be possible to gradually extract the whole saltpetre from the wall, just as it is possible to remove oil spots from wood by repeated applications of wet pipe-clay. This method of drying a damp wall,—although it would effect a radical cure, as long as no fresh formation of saltpetre takes place, and although it would be most advisable from a sanitary point of view,—will not find much favour, on account of its inconvenience, tediousness, and expense. In the rare cases where actual formation of saltpetre is the cause of the dampness in walls, in stables, and closets, a coating of dolomite cement, to which some phosphate of magnesia has been added, has proved a very efficient means for preventing the further formation of saltpetre. As the formation of ammonia always precedes that of nitric acid, the ammonia combines rapidly with the magnesia contained in the mortar to insoluble phosphate of ammonia-magnesia, and the carbonic acid of the decomposing urine contained in the ammonia with the lime to carbonate of lime. As it is, the not inconsiderable quantity of phosphoric acid contained in urine by itself causes the formation of the insoluble magnesia combination.

(*b.*) It is stated by practical builders that half cement mortar, that is, ordinary lime mortar mixed with the same quantity of Portland cement, is the best means for drying the walls of water-closets; no penetration of damp has been observed several years after the new coating has been applied. In Germany, instead of ordinary Portland cement, Erdmenger's Portland cement of dolomite is considered the most suitable for the purpose.

(*c.*) For some time past it has been tried to prevent the penetration of the saltpetre still remaining in the stoves into the fresh plaster by coating the stones and the joints between them with an isolating layer impenetrable by water. Asphalte, either by itself or mixed with linseed oil, has been used; pitch, common rosin, and tar have likewise been recommended, the latter, however, less, on account of its liquid state and its powerful smell. The mass must be melted, and applied hot with a brush. It is imperative that the surface of the stones be completely covered, and the joints between them perfectly closed up; the saltpetre will percolate through the smallest crack, and thus produce wet places on the wall. Before applying the isolating layer, the room must be artificially and very highly heated for several days, to make sure that the exposed stones and joints have been perfectly dried. The asphalte or its mixture with linseed oil must penetrate to a certain extent into the stones to ensure a perfect adhesion; this is not possible if the stones are damp. Small places may also be warmed and dried by holding a charcoal pan close to them. Timber which may be in the damp wall must be treated in the same way; in this case it would be advisable to remove the stonework round the piece of timber as far as it shows damp, to dry the latter well, and then coat it on all sides with asphalte. Upon this isolating layer, which should be from 0·2 in. to 0·4 in. thick without interruption, after hardening, ordinary plaster or gypsum is applied. In carrying out the above, the plaster should be removed, not simply where wet places show themselves, but from 1 ft. to 2 ft. round them, the isolating mass being applied to the same extent, so as to prevent the saltpetre from penetrating sideways and causing damp spots round the edge of the new plaster. It is not to be expected that the latter should combine closely with the isolating mass; it receives its support sideways from the old plaster still sound. This would be no objection where only small patches of plaster had to be renewed; but large wall spaces would sound hollow, and probably might become detached unless a close junction of the plaster with the stones were effected by driving in here and there holdfasts coated with asphalte, before the plaster is put on. A putty of asphalte and mastic, also, was successfully employed at the Allgemeine Hospital of Vienna.

(*d.*) A few years ago tinfoil was recommended as an isolating material. It was put on the wall with paste, after every vestige of the old paper had been removed, the fresh wall-paper being then put on the tinfoil. Although the latter is very cheap (the cost of pure tinfoil in Germany is only 3s. 7d. per kilogramme, or 1s. 9d. per lb., with which quantity a space of about 12 square yards may be covered), and the process is very simple. It was soon found that it cannot be put on a damp wall, on account of the paste decomposing. It was next tried to secure the tinfoil with tacks, but the latter soon began to rust; tin tacks might perhaps be more suitable. No case has been recorded in which tinfoil has been pasted upon a wall previously well dried either by natural means or artificial heat. If the wet places are not too large, it might be

advisable to paste the tinfoil first on the paper, and, after drying, to put the paper on the wall, care being taken to use paste only for the part of the paper free from tinfoil. The paper would thus lie hollow against the wet place on the wall, where the tinfoil acts as a protector against damp. Lead-foil, in place of tinfoil, is not to be recommended, as lead is attacked by damp saltpetre.

(*e.*) Asphalte paper has sometimes been nailed on damp walls; but in such cases a covering of shirting is necessary for receiving the wall-paper. The cost in Germany is about 10d. per square yard. The protection, however, is not permanent, for the asphalte paper lasts only a few years.

(*f.*) There is no record as to the effect of painting damp-walls, but it is well known that such a coating after some time blisters and finally peels off. It would be worth while to examine more closely into the question whether this always takes place, or only under certain conditions. It is thought that several coatings of paint put on a wall well dried by artificial means would penetrate the same, and unite so closely with the plaster as to prevent a peeling off taking place. Three coats of paint would in this case cost about 9d. per square yard. The paper would have to be put on before the last coat of paint is thoroughly dry, as otherwise the paper would not stick.

(*g.*) If wet places in walls assume large dimensions, it is recommended to face the wall with a brick (or tufa stone) wall or boards. The first is expensive and takes up room; joints with the old wall must be made with asphalted bricks to prevent a transmission of saltpetre. The second remedy is that to be adopted in most cases. The process is similar to that applied in boarding walls outside; filling in with straw, however, is omitted. For greater protection, the boards, as well as the beading fastened against the wall, are coated with silicate paint. Such a coating on both sides of the boards costs about 2½d. a square yard. The whole expense for fixing such a boarding, including the covering with shirting, but excluding the wall paper, is at most 2s. per square yard. It appears unnecessary to the author to provide for ventilation between the boarding and the wall by leaving openings at top and bottom, as it is not intended to dry the wall. A consequence of induced ventilation would be simply to cause the covered wall to absorb more or less moisture according to the state of the atmosphere, just as if the boarding had not been put, while with sluggish circulation the wall gets damp and dries more slowly, it being impossible to cut off the access of air entirely. By others, the necessity of thorough ventilation between wall and boarding is insisted on, it being pointed out that rapid circulation must tend to decrease dampness and at the same time prevent the otherwise inevitable formation of mould or fungus in the boards.

(*h.*) Quite recently, wood hangings have been introduced in Germany, serving as isolating layer between ordinary wall-paper and damp walls. These hangings are made in the form of webs or wickerwork of strips of wood or shavings of North Swedish or Finnish pine, 0·04 in. thick, and 1·17 in. to 1·56 in. wide, which are said to resist the effects of damp for a number of years. They are manufactured in lengths of 22 to 33 yards, of a width of 2 ft. 6 in. to 5 ft., and sold at 1s. 4d. per square yard. The wood hangings are fastened to the wall with galvanised nails, the nail-heads being covered with pieces of shavings slipped in, at a cost of about 6d. per square yard. A covering of shirting is also in this case applied before putting on the wall-paper. This wickerwork may be directly used for panelling; the panels are produced by beading, and by leaving the whole in that state, or applying coatings of varnish, or painting the several stripes with various oil colours. Patterns may in this manner be made at a cost of 6d. per square yard; one coating of varnish, at 2½d.; of oil-paint, at 6d. to 1s.

Fourthly. When underground water is the cause of dampness in walls, aphronitre, as a rule, always co-operates. Water alone does not rise so high, as we know from the behaviour of cellars, the sole of which very often is only just above the level of underground water, and the walls of which are nevertheless quite dry. The same means of prevention as above mentioned may be employed; they are, however, only palliatives, which do not dry a damp wall. A radical cure may be effected only either by a perfect isolation of the wall from the source of damp,—which may be done in existing walls by draining at intervals, and isolating from the ground below by the insertion of sheets of asphalte felt,—or by completely eradicating the damp from the wall. This may be done by stamping in between the damp wall, which must be previously stripped of its plaster, and a provisional planking, a layer, about 2 in. in thickness, of fresh quicklime powder. For outside walls the planking may be dispensed with; all that need be done is to dig a trench along the foundation, and fill it with lime. The damp may also be got rid of by heating the rooms with coal-baskets, and by drawing the heated air from the interior by means of a suction-pump connected with a box provided with india-rubber packing, which is pressed against the other side of the wall.

Fifthly. When a building is erected on a slope, and the higher wall becomes saturated with percolating rain-water, a cure can only be effected by cutting a deep trench, and thus draining off the water. If substances containing nitrogen and conducing to the formation of saltpetre have been introduced into the wall through rain, the latter will continue to be damp, and the only palliatives against their injurious effects on the inside faces of walls are those already pointed out.

Since the above was written, the *Badische Gewerbe-Zeitung* has published a few additional remarks by Dr. Meidinger. It is stated that in several cases of dampness in walls a coating of oil-paint, upon which subsequently tinfoil has been pasted, has been found efficient. The two substances combine very closely, and permit of the hanging of paper afterwards. The paint must, however, be put on only in dry weather, or after artificial drying of the wall, and the wet places have entirely disappeared. With regard to boarding of damp walls, it is added that it should not be neglected to asphalte the beading to which the boards are nailed, to protect them against the absorption of water and consequent destruction. Moreover, the boards must not be too far away from the wall, on account of mice. The introduction of air-holes is also to be recommended, experience having shown that in their absence the wood becomes fusty. It has already been pointed out that it is advisable to coat the boards with silicate paint, to prevent rotting. This little extra expense should not be spared, for it is by no means yet proved whether air-holes alone will preserve the boarding; moreover, the introduction of openings for ventilation may be inconvenient. In any case, the naked boards must not touch the wet wall, as otherwise saltpetre would enter them and make them damp also. It would, perhaps, be advisable to remove the plaster wherever damp shows itself, before nailing down the boards. The wall would then absorb less moisture from the air, and would lose it quickly again in dry weather; under these conditions, the space between boards and wall would contain damp air for a shorter time, the presence of which is injurious in any case.

Finally, with respect to the introduction of an isolating layer between stones and mortar, we learn from a prospectus lately issued that a special putty, called Weissang joining putty, has been introduced in Germany which appears to answer the purpose well. The mass, of the nature of asphalte, but without smell, is boiled with an equal weight of linseed oil, and put on as hot as possible. It is stated that about 2 lb. of the mixture cover 1 square yard of wall space. The mass is sold retail in Germany at 1·80 mark per kilogramme (11d. per lb.). As the price of linseed oil there is about 6d. per lb., to coat 1 square yard would cost 1s. 5d. The mixture is applied in a peculiar manner. The wall is stripped of its plaster, the joints being picked out deeply. The latter are then freshly set with mortar. After drying, the hot mixture is put on, and the wall at once thinly rough-plastered. When the latter has dried, plastering is proceeded with as usual. Under these conditions, a close connexion of the plaster with the isolating mass is effected. The latter is recommended also for the protection of gable-walls on the weather side against the penetration of damp; as a substitute for reeds (laths) in plastering on wood; for painting timbers and ironwork in new buildings; for preventing the growth of fungus on wainscoting and other wooden linings; finally, for coating hoardings, garden-rails, barriers, posts, tree and vine stakes.

BARNSLEY AND ITS TRADE.

"Black Barnsley," as it has been often called, has of late years known such improvements that, if the uncomplimentary adjective be allowed, it must be qualified in the quotation, "Black, but comely." It is an ancient town, with fine surroundings, if the dark belt of collieries be pierced through, and its church, modernised and partly rebuilt as it has been, still carries the memory back to the days of the Fourth Henry. It is interesting to compare Barnsley now with what it was forty years ago. Forty years ago it held a court baron; a town-hall was being erected near the earliest church; the principal manufacture was linen, in which thousands of looms in and about the town were employed, whilst steel-wire, steam-engines, and other articles were amongst the productions of the town. In addition to the old church, there were St. George's, built by "grants from Parliamentary Commissioners," and six places of worship for various shades of nonconformity. The population at that time was 10,330 in the latest census return,—that of 1831. There was no railway; there were the Royal Mail, the Express, the Courier, the Amity, and other coaches; a car to Doncaster; Deacon & Co. were the chief of the carriers; and there was the conveyance by water of the Barnsley Canal Co. Nine bleachers were included in the lists of the trades, thirty-one linen manufacturers, and only five coal-masters and merchants, whilst there were also two iron-masters and merchants.

In the years that have passed there has been a large development of trade, of population, and of signs of progress. The population has been much more than doubled, the coal trade has known an enormous development, the introduction of more than one railway line into the town has given it an impetus, and whilst there have been terrible catastrophes in the district, and whilst some of the trades of the town have not known a corresponding development to that of fuel, there are very many and great signs of the material progress of the district, and at present many also of the material prosperity of the chief town also. A fine park was twenty-one years ago given to "bleak" Barnsley; the places of worship have been increased in number and increased also in attractiveness; the fine hall of the miners is in itself an ornament to the town, and, remembering those who have erected it, and its surroundings, it must be acknowledged to be in every way a mark of the appreciation that the working miners have of art, and an enduring tribute to the memory of some of their early leaders in the trade unions. The old and once narrow streets of the town have not been materially improved, but they have the advantage of having newer and nobler ones appended, whilst there has been a very general improvement of the architecture of many of the places of business in the old streets. And the signs of progress are far from being exhausted, for there are indications that a new era of improvement has begun, and that as the coal trade gives wealth to the town it will be in degree applied to its own beatification. For though some of the older trades remain, and one at least has known some extension in the forty years, it must be acknowledged that coal is king in Barnsley. Instead of three or four collieries there are now fifty-six at work in the Barnsley district, and though in the summer time the want of a demand for household coal makes itself felt from time to time, the wages and the yearly earnings of the miners will bear comparison with those of some districts that are perhaps better known in parts of the country. The visitor to Barnsley by the old route sees from the junction all the indications of a prevalence of the industry of King Coal. There are mines of great extent here and there; there are miners' cottages planted on many a slope; and through the streets and village and town at times the miners troop. Miles of sidings abut on the railways stocked with wagons of coal, and the names of some of the collieries are well known, if not their locality, to the coal-consumers of the metropolis. For a number of years that great industry has been deeply depressed, and that depression was reflected fully on Barnsley. Production of coal in many of the coal-yielding districts had been increased until the demand was more than met, and there was a consequential lying idle of some of the collieries

and a serious reduction from time to time in the wages of the workmen. From this state of affairs the coal trade seems now to be slowly and steadily emerging. Demand is better, wages tend upwards, and the facilities of production are much more fully utilised,—though not perhaps to the entire extent possible. As they are so utilised more, the cost of production is increased because the cheapest-worked collieries are those that are wrought in the days of depression, and every addition to the demand draws in others that are not so cheaply worked. And this process has been going on for some months with the result that the price of coal has tended upwards, and with that price the tendency has been first to the fuller employment of the miner, and then to the increase of his wages. This is the cause of the benefit that Barnsley is receiving now, for higher wages mean to it a large circulation of money, and usually better returns for the tradesmen. We seem to have now entered into an era of better times for the coal trade, and in that era, to adopt the maxim of Scotland's great port, "Let Barnsley flourish," if in that prosperity it makes itself still more comely and removes some of the eyesores that still linger from the old days.

THE AMERICAN MOUND BUILDERS.

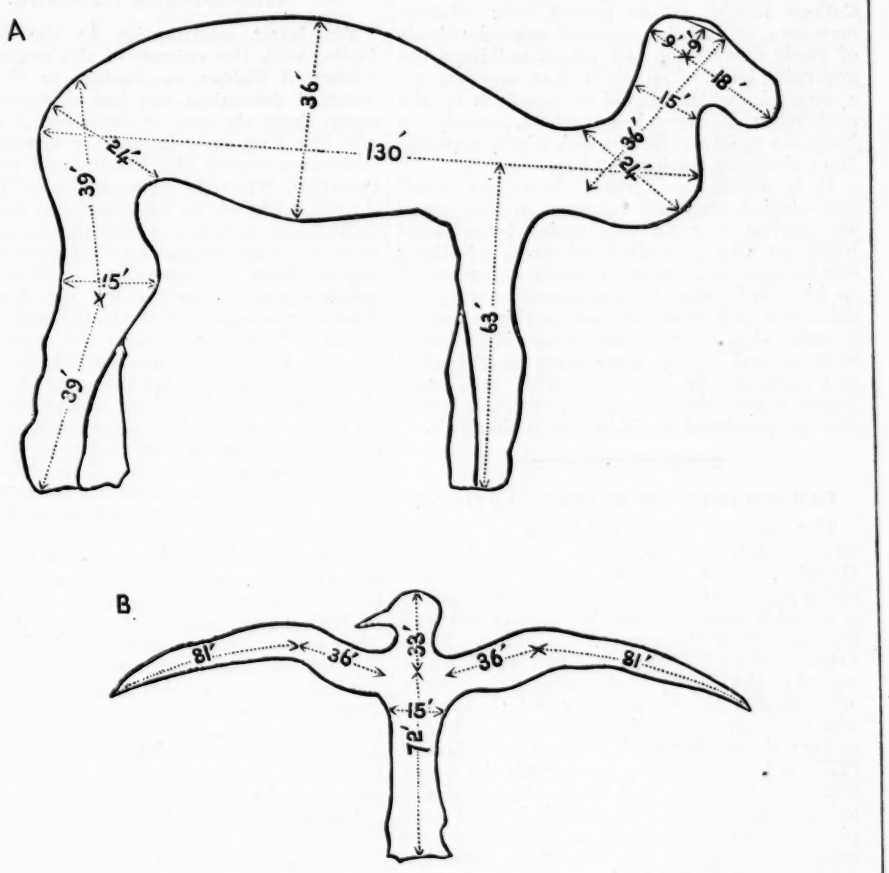
I HAVE, for some months, been making a careful investigation of the works of the American mound-builders along the whole course of their occupation. I was able to trace all those that have been published, notwithstanding that some have been much reduced by the plough. Many, however, and those the most interesting, I found nearly intact, from their being in remote districts and woods where they have never been under culture. Where towns and cities have been built, of course, not a few have been removed, as at St. Louis, Cincinnati, Marietta, &c., but these cities have still extensive works in their vicinities, which act as data to what have been lost. I have found many very curious mounds which are not described in the Smithsonian or other works, and they appear to me of great interest as affording some clue to the intent and objects that the constructors had in view.

From the lowness of the Mississippi and Wisconsin rivers, which have for some years past made the roads communicating with the adjacent localities impassable at this season, I have been able to complete the survey begun several years since by the late Mr. Strong, Civil Engineer to the U.S. Government, who was unfortunately drowned during his survey, which has, I am informed, never been completed, so far as archæological remains are concerned. From a large number of remarkable forms I have examined, I send you an extract from my note-book, giving, in one case, a well-defined mound of a form unlike any I have met with, published or unpublished; and in another, one of a continuous range of mounds of uniform appearance and clearly-expressed purpose.

A.—The first, which approaches the form of a camel more than of any other animal, though the length of the body is a variation from the perfect proportion otherwise uniformly executed by the constructors, singularly enough lies on the same terrace of the Mississippi levels as the well-known "Elephant Mound," which I also examined. One is to the north, the other to the south, of the Wisconsin river. The heads of both are in the same direction, *i.e.*, with the course of the stream, southwards; and the ravine by which the upper levels of the country are approached from this spot is, and has from the first occupation by Europeans, been called "Camel Cooley," cooley being a local term for a ravine or gorge.

B.—The range of mounds (of one of which I inclose an outline) lies on a but-little-known track of the mound-builders between Lake Superior and the Wisconsin river. It consists of twelve enormous bird mounds, locally called eagles; they have a uniform position and definite purpose, as a deviation from their course would have involved death in such seasons of floods as have prevailed in the last few years, and which must have been more prevalent in former times. They are well defined even to the birds' beaks, which all lie in the same direction.

At the northern end of this range of mounds there is a remarkable notification of the twelve forms leading thence towards the Wisconsin river, which is unmistakable in meaning, and



which gives a clue to many other forms of mounds, and even to some characters in the Palenque pictorial alphabet: the details might occupy more space than you could give to this communication.

On the question of the "elephant mound," I may observe, in passing, that elephant figures occur in the Yucatan pictorial writings, and elephant forms, of perfect shape, are found in the museums, carved on the calumets or mound-builders' pipes, which I have seen; while there have been, almost monthly, during my visits to various States, discoveries of elephants' tusks and bones in a high state of preservation, though exposed in swamps to surface water and other destroying effects, tending to show that the elephant existed here during the mound-builders' occupation of this territory. The height of the mounds averages from 2 ft. to 3 ft. at the highest parts, and rises rather abruptly from the surface.

In the Government Geological Surveys of the United States I find the camel and elephant remains are found with the horse, of which I have also found several mounds; and in Bryant & Guy's "History of the United States," these remains, the elephant in particular, are described as found with evidences of human occupation.

This seems to show that though all were extinct on the coming of Europeans, these animals or their descendants might have existed with the mound-builders, as several varieties of each of the animals are described. The llama belonging to the camel species still exists in the South.

J. S. PHENÉ.

Houghton, Michigan, Lake Superior, U.S.A.

NOTES ON THE ISLE OF MAN.

A CONSIDERABLE amount of constructive activity is at present to be seen in the Isle of Man, and large sums of money are being spent upon the erection of additional harbour works, under the general superintendence of Mr. Walker, C.E., the resident engineer to the Harbour Commissioners. Touching, first of all, on this class of work, we find that at Ramsey, the chief town in the north of the island, which has long been in want of better landing accommodation and shelter for shipping, a sum of 31,000*l.* will be spent. At Peel, where the harbour has for some time been inadequate for the wants of the herring fleet when they are fishing from this place, 13,000*l.* is being expended on the inner works and 11,300*l.* on the outer works. At Port St. Mary, which is the chief port of the south part of the island, a breakwater is now being erected, for which 15,000*l.* has been voted by the insular Legislature. Should these works be successfully constructed, they will undoubtedly contribute to the material prosperity of the Isle of Man, as well as give employment during the winter season to many of the fishermen who, owing to the ill-success which attended them during last and the preceding seasons, have somewhat curtailed their fishing ventures. On the other hand, the breakwater which was erected at great pecuniary cost at Port Erin, and to the extreme detriment of the fine coast-scenery, has been a deplorable failure, and upon its repair more money has now to be spent. Nothing, in fact, could show more clearly how impossible it is to produce a frequented port by simply making harbour-works, if there is no natural influx of shipping. Sir John Coode's work at Port Erin may be said to have caused an absolute loss of 72,000*l.* to the Manx people.

Turning to what may be termed more strictly buildings, we find Peel Church in course of reconstruction and a keen contest being waged as to whether or not it shall be turned into a cathedral for the diocese of Sodor and Man. It is not for us to express opinions upon ecclesiastical questions, but we confess we should much prefer to see the parish churches of the Isle of Man made more architecturally beautiful than money expended on a cathedral establishment. A new church, for example, which was recently erected at Port Erin has neither tower nor spire, and so far from being an addition to the scenery is, if anything, a blot on the landscape. It is to be hoped that the new church at Port St. Mary, of which Messrs. Barry & Son, of Liverpool, are the architects, will serve as a model for future religious edifices in this island where architecture is at a low ebb. It would be difficult indeed to find anything more hideous than the houses which are erected for the accommodation of visitors; they are in the most debased style of suburban and watering-place architecture without individuality or beauty. At Port Erin, one of the most picturesque spots in the Isle of Man, with one of the most charming bays and views of coast scenery to be found near the coasts of England, lodging-houses are beginning to be erected which are positive eyesores. In the same way at Douglas many of the houses are of the most monotonous and spiritless character, quite unworthy of the really fine promenade which now partially surrounds

the bay. A new infirmary for King William's College should not be passed over without mention; it is being erected some hundreds of yards away from the school buildings, the governing body of which is thus carrying out a principle which should be acted on by the authorities of every large school, namely, to keep the buildings for the sick wholly separate from those for the healthy boys.

It is noticeable further how the small one-storied thatched cottages in this island are giving way to substantial two-storied buildings with good-sized windows. Nothing can be more satisfactory than to see houses of so improved a kind become general among the fishermen and peasants, and nothing can be a surer sign of material prosperity; but if architectural beauty were more sought after and esteemed in connexion with the larger houses in the Isle of Man, its position architecturally considered would be better than it is.

THE SOCIETY OF BRITISH ARTISTS.

The present winter exhibition at Suffolk-street is rather a good one. In Mr. Howard Helmick, whom we have before noted as a rising painter of *genre*, the Society has acquired a valuable member, and his talents are well represented in the present exhibition. "The Legal Adviser" (22) is his best specimen in regard to the display of character in the figures, only two in number,—a widow and the lawyer, who is making himself as agreeable as he can to her; the smaller work, "The Poor Scholar" (277), is less interesting as regards the figure, but more complete as a whole, the accessories being numerous and well studied; in the former picture there is an effect of bareness on the canvas which gives the idea of an unfinished work. Mr. J. R. Reid, who seems also to have become a member, sends a large oil-sketch, rather than picture, called "The Plagues of the Village," which will be well worth working out into a picture. Mr. Arthur H. Marsh sends a single figure of a young woman carrying an immense bundle of nets on her back, under the title of "The Lass that Loves a Sailor" (267). Mr. Reid's "Reflections" (482), another broad and free sketch, in this case of a coast scene, should be looked at. Among the landscapes, "A Surrey Lane" (235) by Mr. T. J. Watson, is in a much finer and broader style than the majority of those exhibited. Mr. E. Ellis is very spirited in the movement and swing of his rough seas, of which there are various examples, mostly on a tolerably large scale, but they are mannered in colour, and it is not a very agreeable mannerism. Mr. Dendy Sadler, the painter of monks, exhibits a really clever and well-finished picture, "Habet!" (182), representing an interior with two ecclesiastical chess-players at the crisis of the game. Mr. Wyke Bayliss's "At the Cathedral Door" (352) is a nice architectural interior, savouring, however, a little more of the work of the architectural draughtsman or colourist than of the artist in the wider sense. There are various other works in figure-painting and landscape reaching a fair average of merit, and which will interest the "average" visitor; and there are some really pretty terra-cotta models on the centre table, by Mr. W. Merrett, Mr. Raemackers, Miss Barlow, and others. There is, of course, nearly the usual proportion of works which had better not have been painted at all, or, if painted, not exhibited. What can, however, be said is that the best paintings in the collection reach a higher standard than ordinarily.

SEWERAGE WORKS.

SHIRLEY AND FREEMANTLE SEWERAGE.

The Local Board have adopted the recommendation of Mr. J. C. Melliss, C.E., of London, for the diposal of the sewage of their district, and have instructed him and Mr. Pim, C.E., of Southampton, to proceed with the necessary works.

The Proposed New Line to the City.—In a Bill to be brought forward next session for extending the powers of the Regent's Canal and City Railway Company, a clause is inserted empowering the Great Northern Railway Company to hold stock in and subscribe towards the undertaking, and to guarantee the payment of dividend or interest upon such capital.—*City Press.*

THE MOSQUE OF OMAR.

The latest contribution to the literature dealing with the enigma of the origin of the celebrated Kubbet es Sachra, or Mosque of Omar, at Jerusalem, has just appeared in Germany, from the pen of Professor J. N. Sepp, who has long been favourably known for his researches among the monumental edifices of Palestine. The title of his new work, "The Rock Cupola, a Church to St. Sophia by Justinian," indicates at once how widely the author, in his views as to the origin of the Mosque of Omar, departs from the prevailing tradition, which ascribes the edifice to the old Arabian or Saracen conquerors of the Holy Land. So confident is Professor Sepp in the correctness of his new theory that on the title-page of his work he even goes so far as to publish a strange challenge to all who do not accept his view, by an "offer of a prize" of 3,000 piastres to any one who will prove the contrary. The arguments he adduces in favour of his theory seem, at any rate, to have practically convinced some of the best architectural critics of Germany, like Herr W. Lübke. The latter writer remarks that the English travellers, Messrs. Catherwood and Arundale, were the first European travellers to enter the celebrated mosque. This they did in 1833, at the imminent risk of their lives. They subsequently published their drawings of the edifice. The next European who entered the building was another English traveller, Mr. Fergusson, who contended that under the cupola of the Sachra Mosque was the real tomb of Christ. A more important contribution, however, to our knowledge of the mosque is thought to have been made by Count Melchior de Vogüé in his splendid work on the Temple of Jerusalem, published in 1864. The most valuable result established by his beautiful drawings was the confirmation of the Byzantine character of all the main architectonic forms in the edifice. Nevertheless, the belief in the Mahometan origin of the mosque continued to hold its ground, and it was supposed either that portions of a Christian church might have been incorporated into the building, or that possibly a Byzantine architect had been employed in carrying out the work. It was not to be denied that the ground-plan and construction of this monument of architecture diverged completely from the usual type of old Arabian mosques; while, on the other hand, there are characteristic analogies to it to be found in the numerous leading Byzantine buildings. Comparatively recently Professor F. Adler had been permitted to examine the cupola, and the result of his investigations was to convince him of its old Arabian origin. It is against this view that the work of Professor Sepp is directed, the latter writer contending that the structure is of Christian origin, and that it was, in fact, founded by the Emperor Justinian, who is chiefly noted for having erected the Cathedral of St. Sophia at Constantinople.

The weight of the arguments Professor Sepp adduces in support of his opinion cannot, in Herr Lübke's opinion, be denied. He points out that we shall search in vain through the whole series of mosques of undisputed Arabian origin for a central cupola like that at Jerusalem. The oldest Mahometan temples all agree in having a central court surrounded by galleries. How little the ground-plan of the rock-dome was adapted for a mosque is shown by the subsequent addition of the Kibla, which, as is well known, shows the direction in which the prayers of worshippers have to be addressed. Professor Sepp, therefore, has very good ground for asserting that the Sachra Mosque appears about as unsuitable as can well be imagined for the worship of Islam. Herr Lübke remarks, however, that, "on the other hand, even for Christian services, the building is very ill suited indeed, because it does not possess the altar apsis, so indispensable for Christian worship. With the exception of the 'Baptisteries,' we cannot point out any Christian temple without that feature." Professor Sepp then traces the origin of the Arabs and the state of civilisation amongst them at the period of their great conquests. He shows how highly improbable it is that such a race of barbarous nomads should be able to create and execute so grand and perfect a work of art as the celebrated mosque at Jerusalem. The weight of these arguments is only increased when we consider that in architecture the Arabs, as a race, were far less distinguished as bold constructors than as splendid decorators. It is true that there were Turkish architects at a later period who distinguished themselves by the great central cupolas of their works, but it is notorious that it was the model of the St. Sophia Church which inspired them in these unusual achievements. In complete contrast to the Arabs, the Byzantines were celebrated from the first as the great constructors of the Christian world. In a whole series of important domes they had carried out the central idea of a Christian temple. It is known that this tendency prevailed from the time of the Emperor Constantine. Sta. Costanza, near Rome, and still more, the octagonal Antiochia and the Church of the Holy Sepulchre at Jerusalem, are the first important illustrations of this direction of Christian architecture. But it was the Emperor Justinian who, in a series of monumental edifices, brought this style to completion.

It is sufficient to mention as examples, the Church of St. Sergius and Bacchus, St. Vitale at Ravenna, and St. Sophia at Constantinople. That the Omar Mosque may belong to this series, appears in itself quite probable. The probability is strengthened if we consider the character of the architectural forms in the Rock dome, for when we accurately examine the details of De Vogüé's drawings there can remain no doubt that all the fundamental elements of the buildings, except what is immediately recognisable as the later Arab additions and restorations, bear the character of the age of Justinian. Only the twelve slender Corinthian columns of the inner circle may possibly have been borrowed from some other ancient monument. However, we require more accurate and detailed drawings in order to settle this question. On the other hand, the sixteen columns of the octangular gallery, as their capitals with the cross on the abacus, and the Byzantine warrior show, belong to the Justinian epoch. Still more decisive is the observation made by Dr. Bernard Sepp, the author's son, in his examination of the inner arcades. He tells us that the pointed arches prove to be a later Saracen addition, since behind their marble tablets there are still the original Byzantine round arches. If this fact is confirmed there is no longer any reason, so far as the architectural forms are concerned, to doubt the Byzantine and, indeed, Justinian origin of the building. Of course, the entire upper part of the structure the ornamental gallery, and wooden cupola, in the place of which originally there was undoubtedly one of stone, are Mahometan restorations, and date from some time after the great earthquake of the year 1016. The later restorations and additions were carried out under Saladin after the re-conquest of the Holy City in 1189, while the splendid glass paintings with the faïence incrustations were executed under Soliman II., in 1528. If, then, with Professor Sepp we ascribe to Justinian the origin of the dome as well as the contemporaneous architecture of the Golden Port, then in place of the incomprehensible anomaly arising when we attribute the work to the Saracens, we have a result harmonising in the best possible way with the other facts of the history of art, as we must place the cupola among the other great central edifices of Byzantine origin. In connexion with this, the Mosque El Aksa, which is generally supposed to be the St. Maria Church of Justinian, must be set down as an originally Arabic mosque, erected by Abdel Melek with Byzantine building materials. It should be remembered that in the foregoing account we are making known only the views of Professor Sepp and his German critic.

A SEWAGE FARM IN THE LEA VALLEY.

The following are some particulars of the sewerage works which have recently been carried out in the special drainage district of Much Hadham and Hadham Cross, a town situated on the river Ash, a tributary of the Lea. Previously to the execution of the works, the place was in the usual unsatisfactory condition which obtains where cesspools form the only means of disposing of the sewage. A number of the wells were found upon analysis to be contaminated. The district is of a somewhat rural character, and it was considered one where the surface-water generally was sufficiently pure to flow at once into the natural water-courses. The separate system of sewerage was therefore determined upon. The nature of the place made it somewhat difficult

to gravitate the sewage on to land sufficiently raised above the level of flood-waters, and so avoid the error, only too prevalent in the Lea Valley, of discharging sewage on to land too low to be effectively under-drained; but it was found after careful investigation that a suitable site could be acquired some mile down the line of the Ash. The sewage is taken to this land by a 12-in. outfall-sewer, having a gradient of 1 in 660, which contours the side-long ground to the west of the valley for the purpose of obtaining convenient depths. The manholes on the outfall-sewer are furnished with sluices, so that the flow can be headed-up and a velocity obtained in excess of that due to the gradient. The tributary sewers are 9 in. in diameter, with the exception of a short length having a rapid fall, which is 6 in. The gradients are so arranged as to give the greater falls where they are most required, at the upper ends, and average about 1 in 100, except in the case of the principal town sewer, where there is a considerable flow of sewage, which has a gradient of 1 in 300. These sewers also are provided with sluices in the manholes to aid the flushing arrangements. The total length of the sewers is about two miles and a half, and they are constructed throughout of stoneware pipes, jointed with yarn and Portland cement. Particular care was exercised to secure water-tight sewers, and an idea may be gained of the success of these efforts when it is known that, although at the completion of the works not a drop of water got into them (notwithstanding the fact that a considerable section was laid below the level of the subsoil waters), yet before a dozen house-connexions had been made a stream of sewage passed down the whole length of the outfall-main on to the land. Ample ventilation is afforded by manholes and lamp-holes at frequent intervals, which are carried up to the surface and covered with strong iron gratings. These covers are well finished off, having four rings of granite pitching bedded round them, falling slightly away from the centre, so that the danger which so often exists to horses and carriage-springs is entirely obviated. The flushing arrangements are very complete for a district without a water supply. One of the flushing tanks (the largest) is placed at the extreme head of the system, and its contents can be suddenly discharged through a 9-inch outlet pipe. Water is collected chiefly from land drains and the road surfaces, but the large tank already referred to is supplemented with an Abyssinian well and pump, so that even in the dryest seasons water can be obtained at the point where it is most needed; and as the network of sewers is arranged so that nearly the whole can be flushed, if necessary, from this one tank, the system is practically independent of the storage of rainfall for flushing purposes. It has been found by experiments that even without the use of the sluices in the manholes one discharge produces a flow of considerable velocity through the entire length, which is maintained to the extreme point of outfall. No settling-tanks are provided to retain the sewage until putrefaction sets in,—a frequent cause of nuisance,—but a small straining-tank in duplicate receives the flow and intercepts rags, corks, &c. It is needless to say that under the above conditions the sewage reaches the outfall in a fresh state, and becomes assimilated by the soil and vegetation long before decomposition takes place. The sewage farm recently purchased by the Sanitary Authority consists of some four acres of land on the west bank of the Ash. The soil is a light gravel lying above the chalk. Water-tight pipe conduits are constructed along and across the farm, and are furnished with an efficient system of sluice-chambers to enable the sewage to be directed to any required spot. Part of the area has been trenched 2 ft. deep, and the remainder was deeply cross-ploughed. The whole of the sewage is passed over the surface and through the soil. The works have only been completed some six months, and the farm is already in full work. A good roadway has been made along the line of the upper boundary, affording ample facilities for cartage, &c. The system of sewerage is found to work well, and it is to be hoped that as much care has been taken in carrying out the connexions. The total cost of the structural works was under 2,500*l*. Messrs. Smith & Austin were the engineers who designed and carried out the works, and Mr. Barnard Lailey performed the somewhat onerous duties of resident engineer. We hear that at Wormley also, lower down the valley of the Lea, land has been acquired, and that works of sewerage are about to be carried out by the same engineers.

PROPOSED NEW ART GALLERIES, GLASGOW.

A MEETING was held in the Council Chamber, Glasgow, on the 22nd ult., convened by the Lord Provost, with the view of submitting to a number of leading and influential citizens a proposal to provide a suite of buildings to be devoted to the Art Gallery, Industrial Museum, Public Reference Library, and School of Art purposes.

The Lord Provost explained at considerable length the very inadequate provision which at present existed for the purposes mentioned. The Public Library was, he pointed out, accommodated in a portion of a warehouse, temporarily altered to suit library work; while the only museum was the small building in Kelvingrove Park, which, although it might perhaps suit the purpose of a district museum, could never be considered as fitted to meet the requirements of a central and principal industrial museum for a large city like Glasgow. On the other hand, the rooms devoted to art purposes in the Corporation Galleries were totally inadequate as regarded size, and were also very badly suited in construction, and for years the Corporation had been desirous of carrying out some scheme whereby a properly well-lighted building might be secured for art-gallery purposes. At present the school of art was accommodated in the Corporation Galleries, and so unsuitable were the rooms that Glasgow students in national competitions were placed at a most unfair disadvantage when competing with students, even of small provincial towns, where thoroughly equipped schools were provided. The scheme he had to submit proposed to embrace in one block of buildings adequate accommodation for the four purposes he had referred to. If adopted, the scheme involved the purchase of a large square of vacant ground in Sauchiehall-street, immediately to the west of the Corporation Galleries. Were that piece of ground acquired, it was expected there would be ample building accommodation on the south, west, and east sides for a range of art-galleries. On the north side a range of school of art rooms could be placed, and the central part might be filled in with a large industrial museum, having a glass and iron roof. As regarded elevation, it was suggested that the present block of Corporation Art Buildings in Sauchiehall-street be remodelled, and that the site of Dalhousie-street, which separated the present buildings from the block proposed, might be utilised to form a good central entrance for bath blocks of buildings, thus giving a continuous elevation of 560 ft. in length to Sauchiehall-street. To give effect to this pile of buildings, it was proposed to carry the main line of buildings considerably back from the ordinary building line, thus giving a frontage of free street space of about 90 ft. His purpose in convening the meeting had been to endeavour to obtain the support of those interested to assist him in carrying out such a scheme, as he was desirous that the ground should be purchased by public subscription, and presented as a free site to the Corporation.

Several other gentlemen addressed the meeting, and a general expression of approval was given regarding the scheme. A committee was afterwards appointed to take further steps to carry out the proposal.

Sir Philip Cunliffe Owen, the director of South Kensington Museum, has been consulted as to the advisability of carrying out the proposal, and a letter was read from him at the meeting warmly recommending the scheme for adoption.

The Shirhind Canal.—The *Times* Calcutta correspondent telegraphs particulars of the opening, by the Viceroy of India, of the Shirhind Irrigation Canal, one of the greatest works of the kind ever constructed. It will be of immense benefit to the Punjab, as it will irrigate an area of three-quarters of a million acres, or 1,200 square miles. The canal itself is over 500 miles long, and of subsidiary channels there are 2,000 miles more. It has taken forty years to construct and has cost 407 lakhs of rupees.

THE EDUCATION OF ENGINEERS.

THE Society of Engineers, desirous of assisting to maintain the *status* of the profession, have taken a practical step of some importance in the direction of affording additional facilities for professional education. We have received a syllabus of the three series of lectures for which the Society has made arrangements, and which are advertised on our front page. Each of the courses deals with an eminently practical and important subject, and each has been entrusted to an able exponent. The fees payable by those who attend the lectures are exceedingly moderate in amount, and we sincerely trust that the Society's efforts will be rewarded by large attendances in each course. The lectures are open to members of the architectural profession, and each of the courses now advertised,—viz., "Strains on Ironwork," by Mr. Henry Adams; "Land Surveying and Levelling," by Mr. A. T. Walmisley; and "Water Supply and Drainage," by Mr. R. W. Peregrine Birch,—deals with a subject with which every architect ought to be more or less acquainted. The Council of the Society feel persuaded that these lectures will greatly add to the usefulness of the Society, especially in educating the young engineer in technical knowledge, and they express a hope that their members of all classes will place before their pupils and assistants the beneficial advantages to be derived therefrom.

The initiation of these courses of lectures is invested with additional significance when taken in conjunction with a movement which has been set on foot with the view of, sooner or later, establishing an examination which would have to be passed by all who are desirous of becoming members of the body. At the present time, any one, however incompetent, may dub himself a "civil engineer" or "mechanical engineer," just as any one may call himself an "architect" or a "surveyor." Of course it is possible, by the exercise of due care, to discriminate between compent practitioners and pretenders in each and all of these professions; but, unfortunately for themselves, a large proportion of the public are unable to exercise this discrimination unassisted by some such criterion of competency as is afforded by ability to pass the examinations recently established by the Royal Institute of British Architects and the Surveyors' Institution, for architects and surveyors respectively. If it be necessary, for the safety of life and limb, to say nothing of property, that the architect should prove himself to possess a sound knowledge of construction before being allowed to practise, and if those who employ him have a right to demand of him some proof of his competence, it is obviously no less essential that the members of the engineering profession,—whose ramifications are so wide, and upon the stability and strength of whose works the lives, health, and means of millions of people are dependent,—should show themselves to be worthy and competent followers of their great calling. It is true that, engineering enterprises being very often on a vast scale, involving the expenditure of millions of money, the promoters may generally be relied upon to confide their interests to men of proved attainments and distinction in the engineering profession; but these great works have to be carried out under the personal supervision of younger men acting as resident engineers, who ought to be (as they mostly are) men of skill and resource in dealing with any emergency that may arise.

Much more might be said in favour of the institution of an examination for civil and mechanical engineers, but before such an examination can be established, there are many points to be considered. Those who are stirring in the present movement point to the Institution of Civil Engineers as the examining body. It has been suggested, however, that as the proposed examination is intended for mechanical as well as civil engineers, better results would follow from the appointment of a board of examiners jointly appointed by the Institution of Civil Engineers and the Institution of Mechanical Engineers,—the senior representative bodies of the two branches of the engineering profession. In the event of an Engineering Examination being established under such auspices, the question would arise,—it has, indeed, been anticipated,—Shall the Institution of Civil Engineers remain an educating body when it becomes an examining body? Those who favour the present movement are disposed to answer this question in the negative, and they

suggest that the large number of students now under by the ægis of the Institution should be transferred to one of the junior engineering societies, which should become essentially an educational body, carrying on its work under very much the same method of organisation, as we understand it, as prevails in the Architectural Association. In this way, it is urged, the newly-organised junior society would, in conjunction with existing educational agencies, afford a constant stream of candidates for the proposed examination. The projectors may be over-sanguine, but there is, nevertheless, much in the project that is worthy of consideration.

CHANCEL DECORATIONS AT ST. PAUL'S CHURCH, WALWORTH.

The chancel of St. Paul's Church, Lorrimore-square, Walworth, which until recently was well known as one of the most advanced ritualistic churches in the metropolis, has, during the last three months, been undergoing a very elaborate process of re-decoration, notwithstanding that the high ritual for which the church was formerly distinguished has to some extent been abandoned. The decorations having been completed, the chancel was re-opened last week with special services. The east wall of the chancel has been decorated in gold and varied colours, and Scriptural figures introduced. The subjects represented are full-length figures of the four evangelists, with busts of the four great prophets, Isaiah, Jeremiah, Ezekiel, and Daniel; whilst underneath, on either side of the altar table, are emblems of the Passion. The two returning north and south walls have also been decorated and painted, the artistic work consisting of pomegranate foliage. The panels of the chancel ceiling have likewise been included in the decorations. Those portions of the panels immediately over the sacrarium have been painted in turquoise blue, with gold stars, and the remaining panels in oak. A massive new reredos has also been placed over the altar. The subject of the reredos is the Adoring Angels, in marble mosaics, enclosed in a framework of alabaster. Carved oak clergy and choir stalls have likewise been introduced, replacing the old painted stalls. The front of the organ has also been re-decorated, and the stained-glass east window has been lengthened.

Messrs. Heaton, Butler, & Bayne, of Garrick-street, Covent-garden, have executed the decorations, and furnished the reredos, the clergy and choir stalls having been furnished by Messrs. Earp, of Kennington-road. The whole of the works have been carried out under the supervision of Mr. Arthur Blomfield, architect, at the cost of the Rev. Evylin Alexander, the vicar.

NEW BUILDINGS FOR MESSRS. CROSSE & BLACKWELL.

On the site in Belvedere-road, Lambeth, formerly occupied by the premises of Messrs. Holland & Hannen, an extensive new block of buildings is now in course of erection for Messrs. Crosse & Blackwell. The buildings will cover a ground area of 25,000 ft., the depth from Belvedere-road to the river being 200 ft. The premises will have a frontage to the Thames, 125 ft. long, the river elevation being 70 ft. in height to the cornice, the roof, which will contain a lantern light, being carried to a further height of 20 ft. The elevation will be in red brick, from the Adderley Park Company's Works, Saltley, near Birmingham, with red terra-cotta strings, window arches, and cornice, furnished by Messrs. Doulton & Sons. The building will contain six lofty floors, and a basement carried to a depth of 10 ft. below the ordinary high-water mark, and having a Wilkinson's concrete floor. The Belvedere-road frontage will also be in red brick and terra-cotta, and will be four stories in height.

The entrance in Belvedere-road, 14 ft. in width, leads into a large open courtyard, 90 ft. in length by 40 ft. in width, around which are the several buildings, divided into six blocks. On the south-east side of the entrance, on the ground floor, is the boiler-house, an apartment 45 ft. square, whilst at the opposite angle are the stables, the remaining portion of the floor consisting of six spacious warehouses. The several upper floors likewise contain large warehouses, besides manufacturing, preparing, and packing premises, together with ranges of offices. The several floors will contain an aggregate floor space of about 60,000 ft., or nearly an acre and a half in extent, exclusive of the basement, which will contain cellarage and storage space.

Messrs. Roumieu & Aitchison, of Lancaster-place, are the architects, and Mr. F. S. King, of Billiter-avenue, the contractor. Mr. Weston is clerk of the works.

THE REGENT'S CANAL AND CITY RAILWAY.

PURCHASE OF LAND.

The Regent's Canal, City, and Docks Railway Company, which obtained an Act of Parliament last session, after a protracted and expensive contest in the Parliamentary committee-rooms, are immediately about to commence the construction of the line, and are making the necessary purchases of land. The project includes the building of a station in the neighbourhood of Aldersgate-street, not far from the station of the Metropolitan Company, and for this station and the general purposes of their undertaking the company have just purchased the large area of land on the south-east boundary of the City in Golden-lane. The land, which has for some time past been vacant, and which contains 45,336 square feet, has been bought from the City authorities for the sum of 80,592*l.*, being at the rate of nearly 2*l.* per foot. It is stated that the purchase-money is intended to be applied to the erection of artisans' dwellings in Petticoat-square, eastward of Golden-lane.

BURGOS CATHEDRAL.

This structure, to which we have recently drawn attention, is one of the finest specimens of ecclesiastical architecture in Spain. It is now being restored, and being provided with stained-glass windows. For the purpose of the latter work, a competition was instituted in which the principal stained-glass works of Europe took part. The commission (which was composed of members of the Madrid Academy) awarded the prize to Zetler, of Munich. The main subject is the Assumption of the Virgin, which will be represented in the principal window.

The early history of this cathedral is involved in much obscurity; but a few trustworthy data are available. It is certain that the foundation-stone of the edifice was laid on July 20, 1221, by King Fernando III., together with his queen, Beatriz, and Bishop Mauricio, as is shown by an entry in an old calendar of the church, where it is stated, "Primus lapis ponitur in fundamento novi operis ecclesiae burgensis xx. di mensis Julii, era millessima ducentessima quinquagesima nona, die Sanctae Margaritae." The works were not brought to a final conclusion until the month of December, 1864, when, at the initiative of Archbishop De la Puente, the door known as Sarmental was renewed, and a fresh floor of white and blue Carrara marble laid down. According to a French writer, Paul Alary ("Voyage artistique"), the church "is a legacy four centuries old, to which each generation has added its share of artistic wonders. It is an inlaid stonework, a kind of gigantic filagree work, which inspires the beholder with enthusiasm and a kind of awe at its more than human execution."

The exterior of the cathedral is even more imposing than its interior. The illustration which we give in this week's *Builder* represents a front view, and produces a striking effect. The façade is flanked by two gigantic steeples richly and tastefully adorned, the whole forming a characteristic specimen of the art of the times. According to Dr. Martinez y Sanz, those steeples, at sunset, when the sun's rays strike the metal and wood work below, appear from a distance to be floating in the air. Behind the façade rises from the centre of the transept a powerful lantern, surrounded by a circlet of eight turrets of fine workmanship, respecting which the Emperor Charles V. is reported to have said that they ought to be preserved in a case as a precious jewel. The view is closed in by another mass of turrets and finials rising, respectively, over the chapels of the Coroneria, Pellejeria, and Condestable.

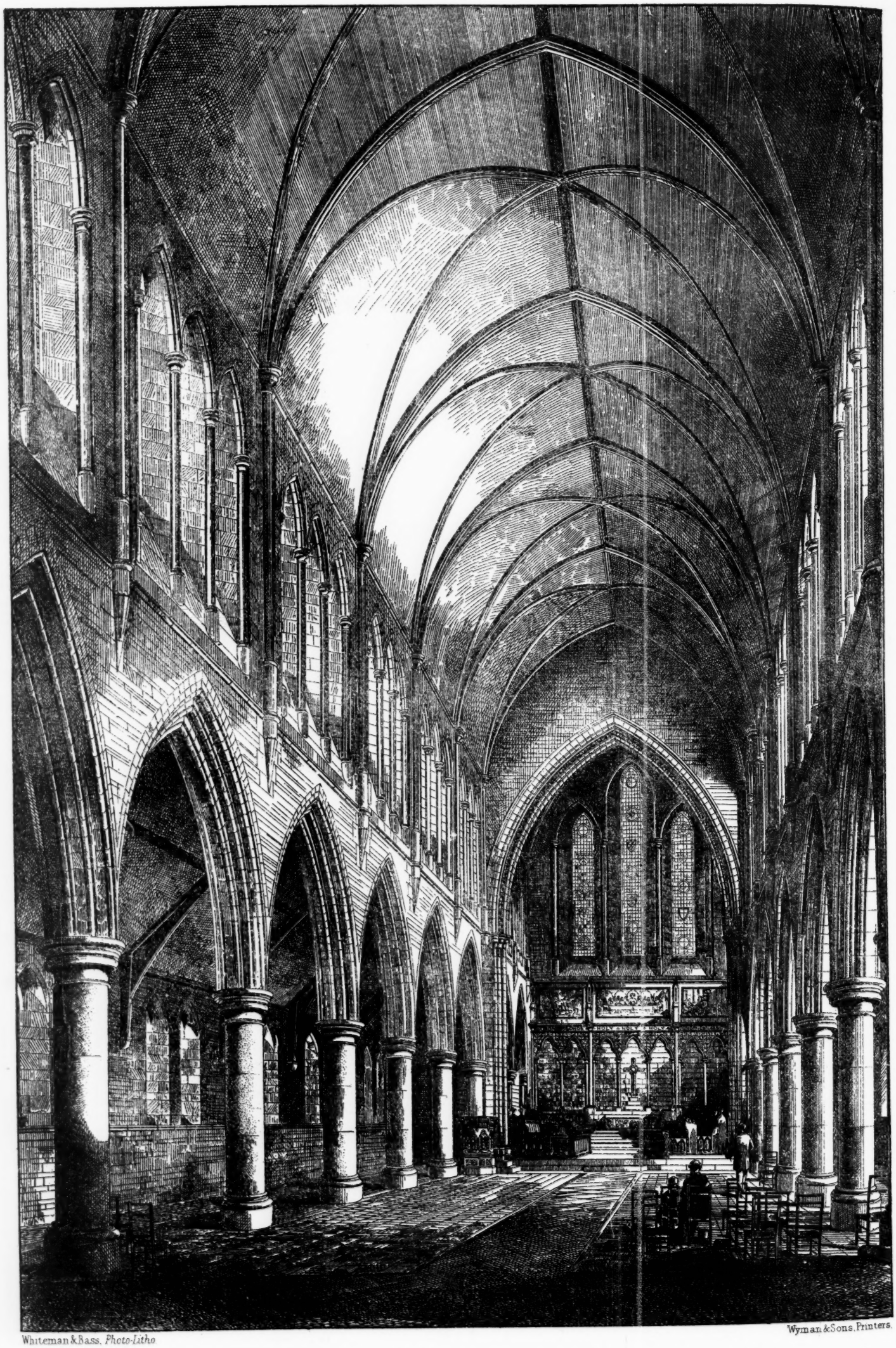
We learn from another entry in the same calendar that it was nine years after the commencement of the works, in 1230,—"*era millessima ducentessima sexagessima octava*,"—that divine service was held in the cathedral. A hundred years later, on June 4, 1336, royal letters patent, granted by King Alfonso XI., witness that the "masters are at work on this church." Another record, in *Libro redondo* (vol. lvii.), points to "Tuesday, September 18, 1442, as the day on which the first stone was laid for the towers which are now being renewed in the Church of Santa Maria of Burgos." Still another entry in the same *Libro redondo* (vol. lxxiii.) states that "the towers which rise over the Puerta Real were finished on September 4 of the year of our Lord 1458." Both are said to have been built on the plans and under the direction of the architect Juan de Colonia, and at the expense of Bishops Alonso de Cartagena and his immediate successor, Luis de Acuña.

The first story of the principal façade is not the original work; of the latter, which was constructed as far back as the thirteenth century, only a faint reminiscence remains, in the shape of a crude engraving in vol. xxvi. of *España Sagrada*, a work by Padre M. Florez. It is reported that, ruin threatening the façade, it was replaced by another, erected at the instance of Archbishop Rodriguez de Arellano by the architect Gonzalez de Lara. According to another record, it was discovered in 1749 that the towers showed signs of failing, owing, it is stated to the left tower being built on a slight elevation of the ground, instead of a solid foundation. The damage, however, cannot have been very serious, for it was repaired by two architects, Manuel Cueto and Domingo Ondátegui, at a total expense of 25,000 reales (about 250*l.*).

The transept of the cathedral has also undergone several vicissitudes. It was completed at about the end of the fifteenth century, at the expense of Bishop Acuña, and is described by a contemporary as an "*affabrè constructum*." According to Bishop Ampudia, it was "one of the most beautiful works of the universe." The transept was totally destroyed (by fire?) at the dawn of Tuesday, March 4th, 1539, after only fifty years of existence. A few hours after the catastrophe, however, the municipal corporation of Burgos, by a unanimous vote, resolved to rebuild the transept, "confident of the pious generosity of the inhabitants of Burgos." Having, within a few days, collected the sum of 450,000 maravedises (about 1,500*l.*), the work of rebuilding was proceeded with under the direction of the architects, Francisco de Colonia and his successor, Juan de Vallejo. A beginning was made in October of the same year, and the work was completed in December, 1567, twenty-eight years after its commencement. On August 16th, 1642, we learn further, about 7.30 p.m., a strong hurricane overthrew the turrets of the cupola or lantern. The inhabitants of Burgos again came generously to the rescue, together with the cathedral chapter and the bishop, "moneys being received for this purpose from the Indies from native Burgenses and others." The work of restoration was carried on under the direction of the architect Juan de Rivas, and finished on July 19th, 1644. Strangely enough, in the morning of the very next day, on July 20th, the Burgenses were roused from their slumbers by the pealing of bells, announcing that fire had broken out, and to their horror they found that the transept of their cathedral was in flames, which threatened at one time to envelop the whole building. However, by great exertion the fire was confined to the transept, and was got under without doing great damage.

If it is asked who were the architects of the cathedral, we meet with a long roll of names. The first one mentioned in the records of the municipal archives is Enrique, who also directed the works of Leon Cathedral; he died on July 10th, 1277. The second was Juan Perez, who died in 1296, and was buried in one of the cloisters of the cathedral, and is supposed to have been a brother of Pedro Perez, the painter of Toledo Cathedral, who died six years before, in 1290. The third architect of Burgos Cathedral was Pedro Sanchez, who directed the works in 1384. After that, Juan Sanchez de la Molina, Martin Fernandez, the three Colonias, Juan de Vallejo, Diego de Siloe, Nicolas de Vergara, Matienzo, Pieredonda, Gil, Regines, and others, laboured successively; as well as, during the fourteenth and fifteenth centuries, many Moors, such as Mahomad, Yunce, the "master" Hali, the master Mahomet de Aranda, the master Yunza de Carrian, the master carpenter Brahen, &c. Amongst sculptors may be mentioned Juan Sanchez de Fromesta, the masters Gil y Copin, Felipe de Vigardi, Juan de Lancre, Anton de Soto, Juan de Villareal, Pedro de Colindres, and many others.

BURGOS CATHEDRAL.



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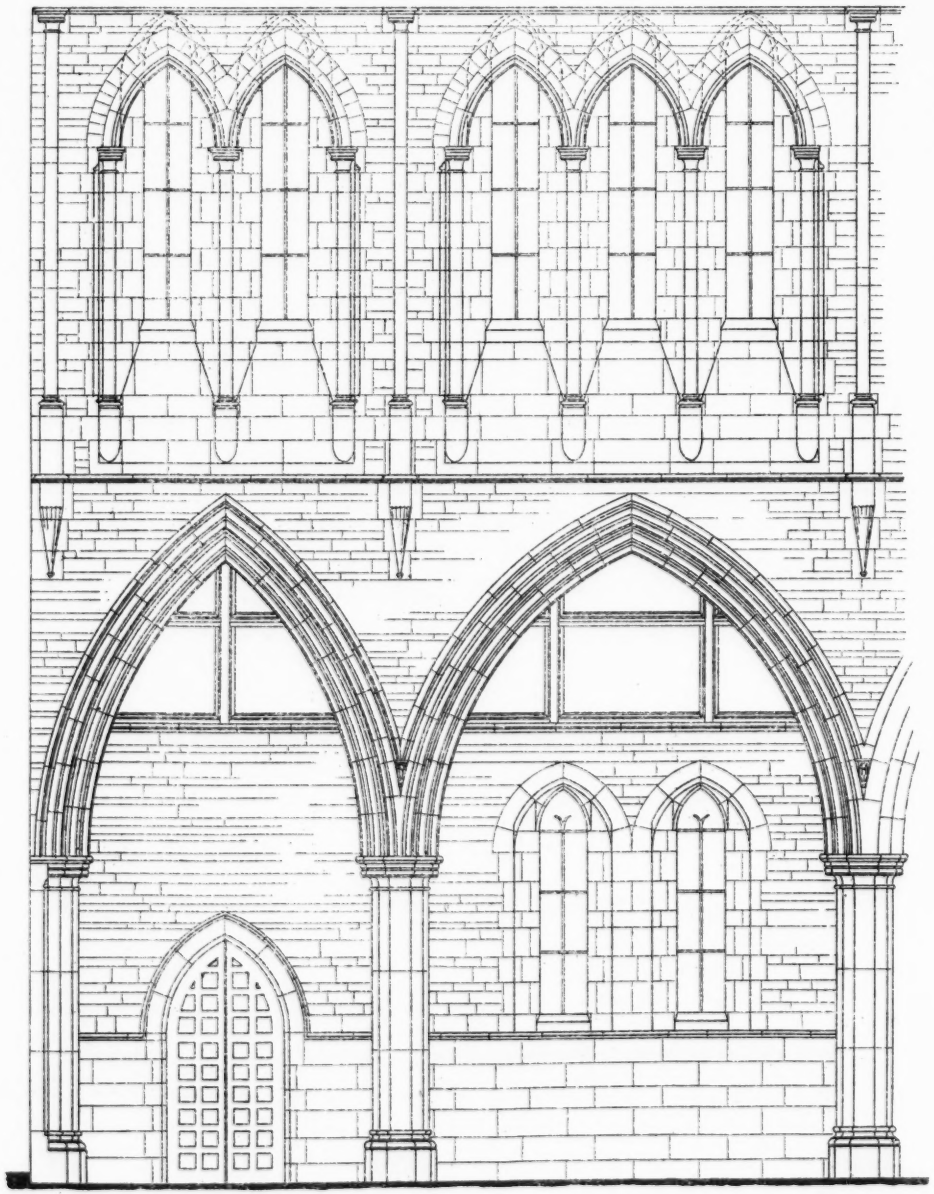
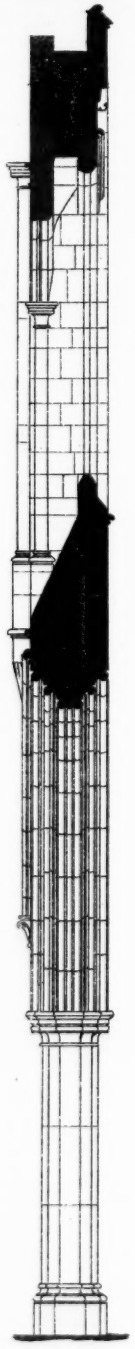
THE NEW PARISH CHURCH OF S. PAUL, HAMMERSMITH.

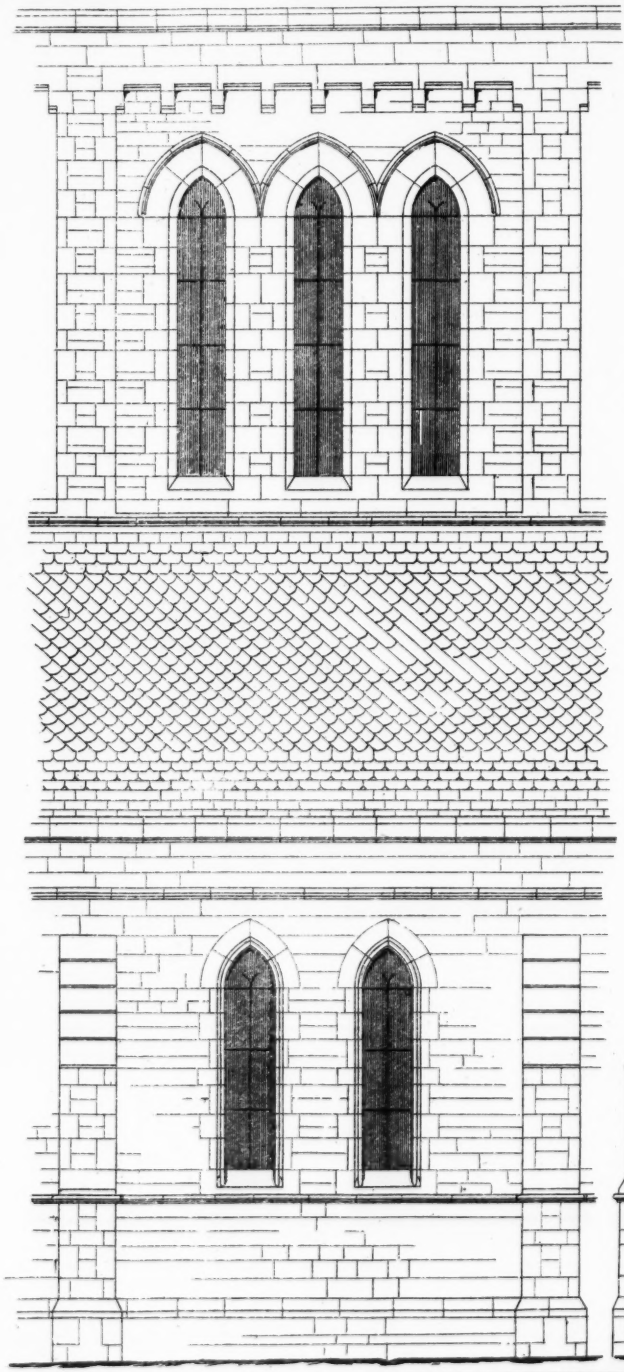
JOHN P. SEDDON & HUGH ROUMIEU GOUGH, JOINT ARCHITECTS.

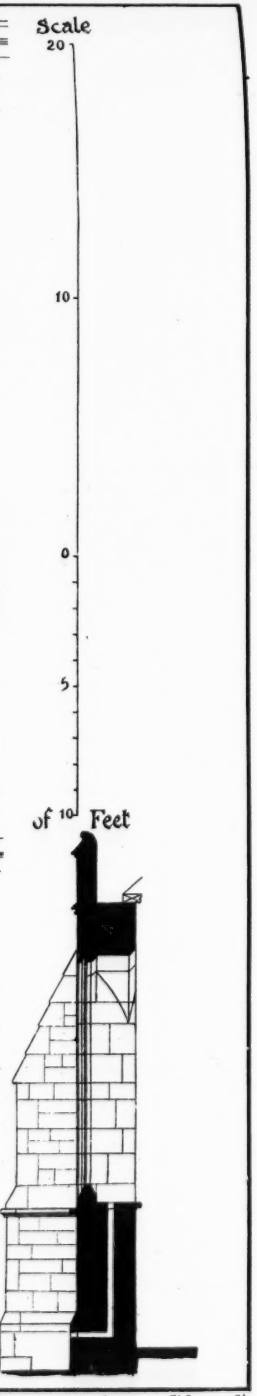
PARISH CHURCH OF S. PAUL - HAMMERSMITH

Interior and Exterior of Nave.









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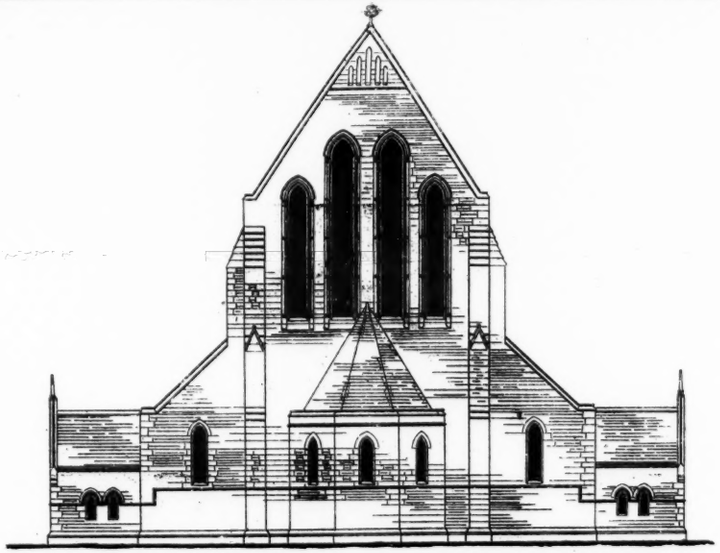
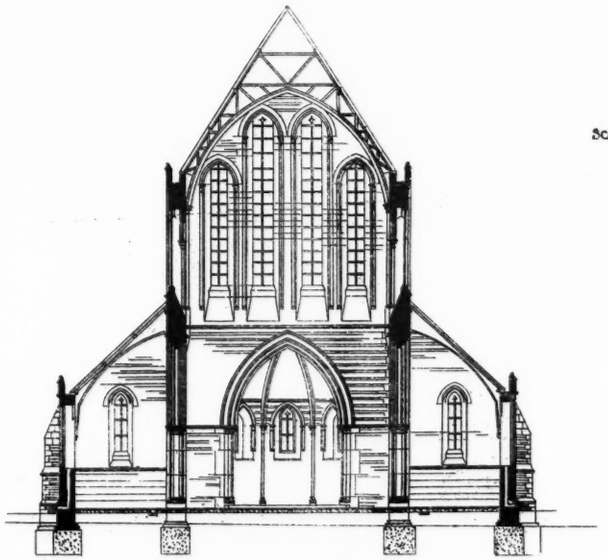
PARISH CHURCH OF S. PAUL - HAMMERSMITH

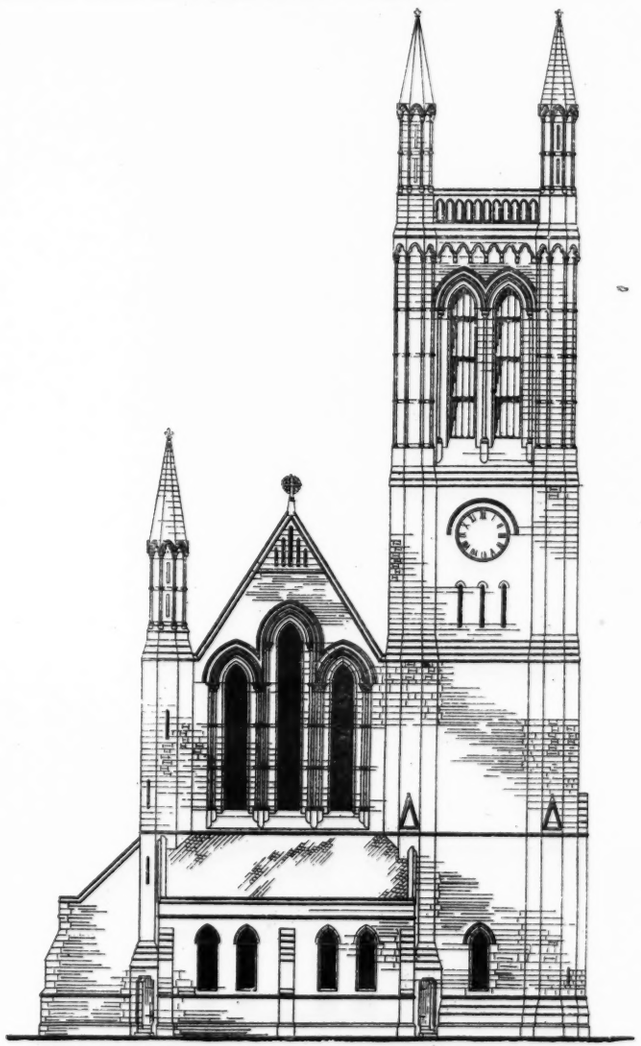
SCALE OF 10 5 0 10 20 30 40 50 FEET.



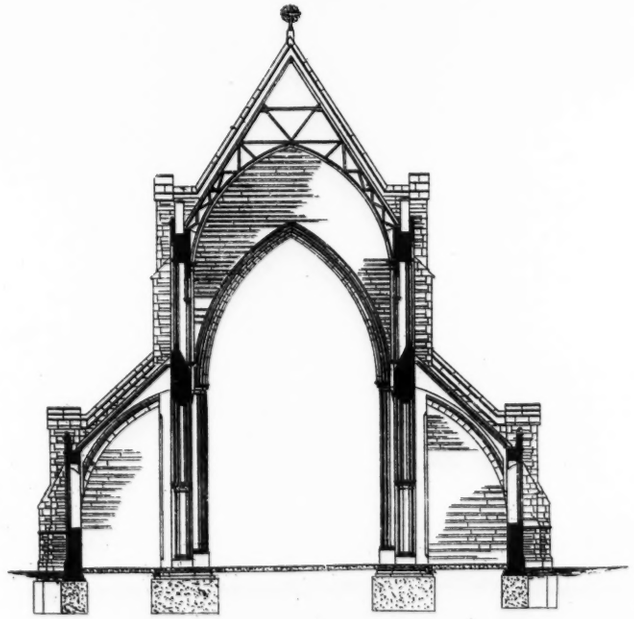
WEST ELEVATION.



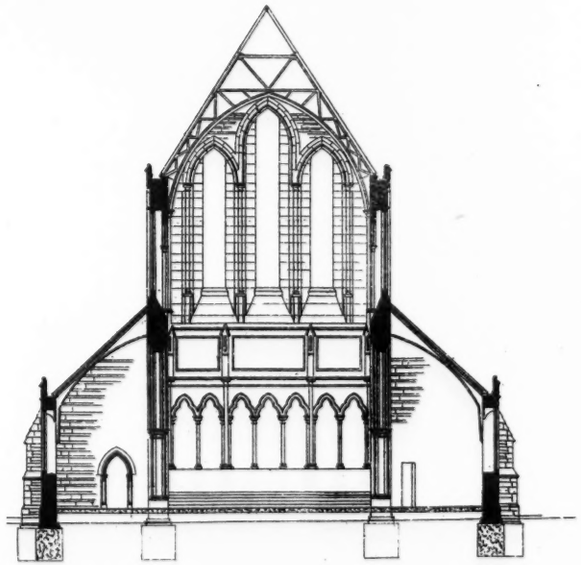
SECTION LOOKING WEST.



EAST ELEVATION.



Section looking East



Section through Chancel

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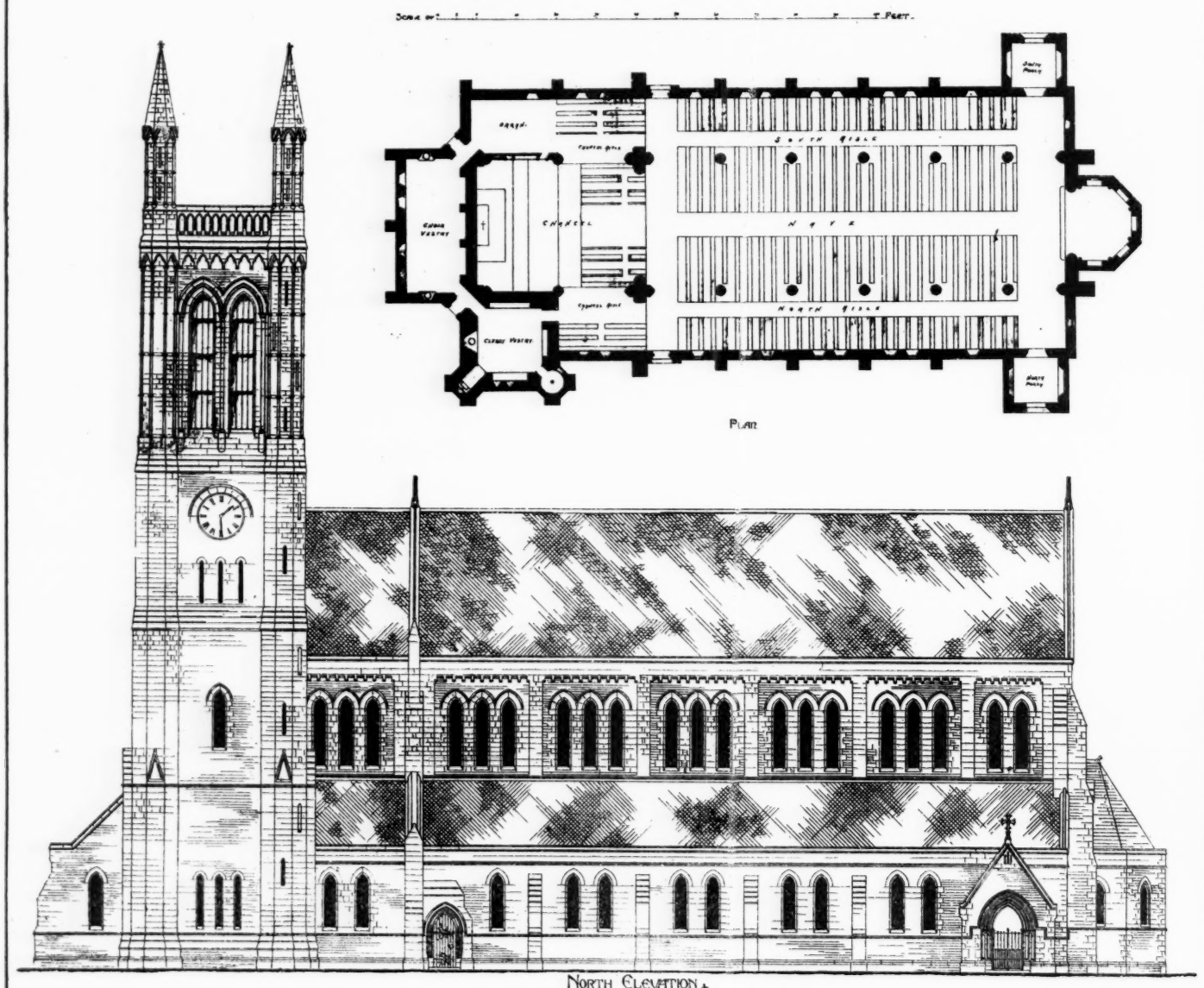
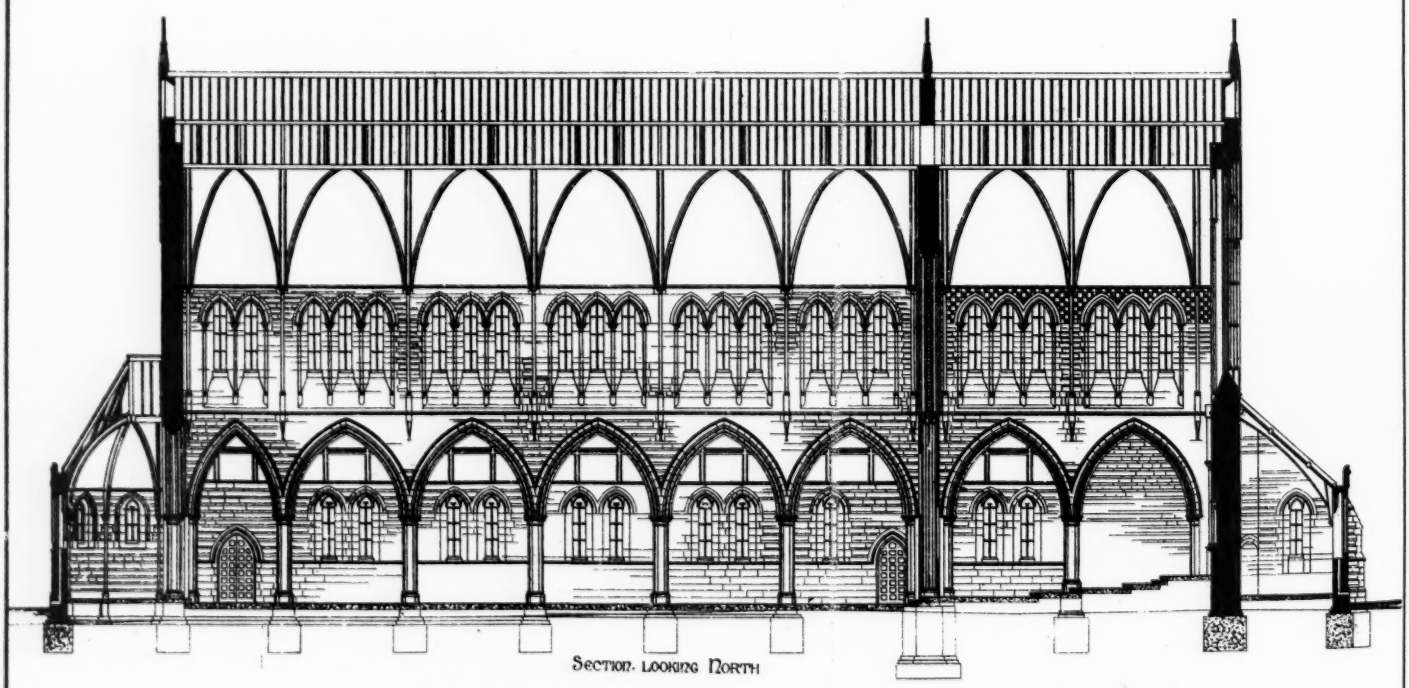


PLAN

NORTH ELEVATION



SECTION. LOOKING NORTH

PARISH CHURCH OF S. PAUL · HAMMERSMITH

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ST. PAUL'S CHURCH, HAMMERSMITH.

THIS church, which forms the subject of our lithographic illustration pages this week, is in course of erection under the direction of Messrs. J. P. Seddon and Hugh Roumieu Gough, as joint architects. From the paper read by Mr. Seddon before the Architectural Association on the 24th ult., we take the following descriptive particulars, the drawings being part of his illustrations,—

In order to obtain the lofty proportions particularly desired by my colleague and the committee, it was necessary that the building should be dignified but simple, and devoid of ornate detail, as the funds at our command were strictly limited. Such being the case, we have given great study to the question of the materials, and have reason to think that we have been somewhat exceptionally fortunate in that respect. The stone for the exterior wall masonry is of red Mansfield, laid in horizontal courses, with the facework hammer-dressed. This is being supplied from Mr. Robert Lindley's well-known quarries at a price which competes favourably with that of the far colder and less pleasant looking Kentish ragstone with which Londoners are, in our opinion, unfortunately too familiar. Then the stone for the facing of the walls internally is brown Ancaster, of a rich warm colour, but beautifully varied. This is, we think, the first time that this has been used in the metropolis, although in Mediæval times it was extensively used in the churches of Lincolnshire; and indeed the quarries, which also belong to Mr. Lindley, were worked by the Romans. As regards the stonework for the dressings we have been less fortunate; we had hoped to have had all the dressings executed in red Mansfield, but owing to the great cost of working, we have been compelled to content ourselves with Box-ground stone for the exterior and Corsham Down for the interior, the blue bed of which has been selected by us generally for the aisles, in order that they may harmonise with the marble of which I am about to speak. The whole of the columns and responds, with their bases and capitals, are of a Belgian marble, known on the Continent as "Belgian granite," and much used in old Flemish churches, as well as in those of parts of France. The quarries from which we are obtaining this material are situated at Soignies, near Brussels, and are so extensive to be practically inexhaustible. This marble can be obtained in blocks of almost any size, and the isolated columns in this church are of single stones 2 ft. 2 in. in diameter and about 10 ft. long. Its appearance is very similar to our Purbeck marble, though for richness and beauty of colour, in our opinion, this Belgian marble is superior. It has also the advantage of being exceedingly cheap, owing to the comparatively low rate of wages paid in Belgium. This is being used for the first time in England for this work. Mr. Gough, who has visited the quarries, will, I am sure, be happy to give you any information regarding this excellent material, with which, I may add, it is the intention to line the inside walls of the church up to the string-course below the sills of the aisle windows. The whole of this marble that I have mentioned, with the exception of the capitals and bases of the columns, will be polished. I would call attention to the construction of the roof as being novel in ecclesiastical architecture and different from any of those I have previously described. Iron for structural purposes has been hitherto rather the friend of the engineer than of the architect; indeed, to the latter, and I must own to myself, it has been almost held as an enemy. We should not have used it from choice in this instance, but the necessity for economy, and the desirability of avoiding all lateral thrust upon the lofty clear-story walls, and any visible ties which would have to cross under the vaulted ceiling, led us to its adoption. Mr. Gough's engineering knowledge, acquired many years ago whilst in the Government service, has, I think, well solved the difficulties of the problem, though in a different manner to that in which I have attempted to do so. Each of the latticed wrought-iron principals is, in fact, a girder, exerting no outward thrust whatever, except, of course, what may be due to wind pressure, which is felt in every roof, no matter what its construction may be. In this respect the report of Mr. Bidder, the engineer, so entirely confirms Mr. Gough's opinion as to disarm further criticism, since æsthetic considerations are, in this instance, outside the question. No portion of the ironwork of the roof will be left visible, as there will be a ceiling with groining ribs below it, which it is intended to treat with coloured decorations.

ARCHITECTURAL ASSOCIATION.

AT the ordinary fortnightly meeting of this Association on the 24th ult., Mr. Edward G. Hayes, President, in the chair, the following gentlemen were duly elected members, viz.:—Messrs. A. Kent, G. J. Oakeshott, A. R. Manby, T. B. Rutherford, F. W. Macey, A. B. Johnson, H. H. Hughes, H. W. Collins, T. R. Clemence, A. Gordon, S. Strudwick, A. Roberts, E. T. Boardman, S. H. Seager, J. W. Stonhold, E. E. Brooks, T. E. Watkins, H. H. Satchell, W. F. Cave, A. H. Hart, W. J. W. Ferguson, C. W. Wright, H. S. Perkins, W. W. Short, J. Short, P. Thompson, W. E. Potts, H. H. Mew, A. E. Hanscomb, H. Baker, T. Leadbetter, A. R. Wright, W. G. Nicol, A. H. Freeman, A. W. Bentham, E. W. Knight, C. S. Hornabrook, H. Hutchings, J. A. Whichcord, A. Clark, H. J. Westell, F. Williamson, C. H. Bedells, J. H. Goodman, H. L. Whiteley, F. A. Steer, J. E. Still, W. Sheen, jun., W. F. Kelsey, M. Fawcett, E. A. Barnard, A. S. Tayler, F. Massie, H. H. Flowers, F. M. Elgood, G. L. Stutfield, W. A. Moull, A. B. Atkinson, A. J. Ward, and W. Leck (sixty in all).

The Chairman then formally moved the adoption of the annual report of the Association, which contains the following passages:—

"The committee, in presenting the report of the past session, while being able to announce a continuance of the prosperity of the Association, and a rapid increase in the number of its members, feel that the attendance at the various classes during the past session has been scarcely in proportion to that increase; they desire, therefore, to direct the special notice of members to the great advantages to be derived from taking an active part in the working of one or more of the classes; these being, especially to the younger members, among the most useful of the many valuable opportunities and advantages afforded by this Association. The committee trust that during the coming session the classes will be fully appreciated and attended by greatly increased numbers.

Great improvement has, during the past session, been observed in the discussions following the papers read at the general meetings, and the committee hope that this improvement will be fully maintained, and still further developed throughout the coming session. . . . .

The library now contains about 1,200 volumes, and continues to be well attended. A new and revised catalogue has been prepared. . . . .

The courses of lectures in connexion with the Classes of Design and Construction, referred to in the report of last session, have been given by Messrs. Tarver and Blashill, and have been numerously attended. The thanks of the whole body of the Association are due to these gentlemen for their very valuable services. A special grant has been made to the library for the purchase of books for the use of those availing themselves of these lectures. The courses of lectures will be repeated during the coming session.

The new class formed for the study of planning and specification-writing has been well attended, and the syllabus for the session energetically carried out.

The Association Travelling Studentship has this year been won by Mr. W. A. Pite; Mr. F. H. Tulloch being awarded the second prize; and Mr. A. S. Haynes receiving Hon. Mention.

The following are amongst the honours taken by members of the Association during the past session:—

Royal Institute of British Architects.

Godwin Bursary	A. J. Gale.
Soane Medallion	A. B. Pite.
Second Medal	L. Stokes.
Hon. Mention	G. H. Shackle.
Grissel Gold Medal	H. P. Drew.

Royal Academy.

Travelling Studentship and Gold Medal	J. H. Ince.
Silver Medal for Measured Drawings	T. C. Yates.

Contributions to the Prize Fund have been made by Messrs. Aston Webb and Ernest C. Lee."

The report was adopted without discussion.

Mr. J. Douglass Mathews, treasurer, moved the adoption of the balance-sheet, which showed that the total receipts for the session 1881-82 had been 724*l.* 6s. 4d. (including 112*l.* 14s. 4d. balance brought forward from the previous session). The amount received for members' subscriptions was 381*l.* 19s., while entrance-fees amounted to 112*l.* 7s. The total expenditure was 595*l.* 7s. 6d. (including 155*l.* for rent), leaving a balance of 128*l.* 18s. 10d. in the treasurer's hands.

The Chairman called attention to the last-issued number of the "Proceedings" of the Royal Institute of British Architects, which contained a great deal of useful matter for the guidance of all young architects who were preparing for the Architectural Examination. It was gratifying to note that the Institute had fully recognised the work which was being done by the Association, and had largely quoted from the "Brown Book."

Mr. Douglass Mathews said he was glad the President had called attention to the matter. Young architects who were seeking to make themselves proficient in their profession ought to be grateful for the facilities now afforded them, for instead of being left to flounder about in search of knowledge, as they would have had to do a few years ago, they had now a complete course of study laid down for them by those who were fully cognisant of their requirements, and it would be their own fault if they did not avail themselves of the facilities now within their reach.

Mr. A. Beresford Pite said he believed that in the Institute scheme of Examination 175 marks were allotted to Art and 425 marks to Construction. He wished to know whether the Association was to be understood as endorsing such a distribution of marks, and whether the proportion of marks was to be taken as indicative of the Association's view of the relative importance of these two subjects in an architect's education?

The Chairman ruled that the question raised by Mr. Pite could not be discussed on that occasion.

Mr. Stannus having given a kindly lecture to those members of the Association who thoughtlessly or selfishly keep in their possession beyond the specified time the books which they borrow from the library,—to the great detriment and injury of their fellow-members who need the books for purposes of study,—

Mr. John P. Seddon proceeded to read his paper on "Sundry Working Drawings," the first portion of which we print on another page. We also reproduce some of the drawings with which the paper was illustrated.

The Chairman, in opening the discussion, observed that Mr. Seddon had touched upon a great variety of subjects in his very interesting paper. He had expressed a misgiving lest he might be accused of egotism in bringing his works before them, but that was precisely the kind of egotism of which they in that room would be glad to see a little more, for nothing could be more useful to the younger members of the profession than for a gentleman of Mr. Seddon's experience and mastery of his art to take the trouble to show and explain to them so many drawings. He was very glad that Mr. Seddon had so strongly insisted upon the necessity of architects making their working drawings as clear as possible. Such drawings should be without a superfluous line, and free from shading, or some ludicrous results might follow if the drawings were put into the hands of unintelligent workmen. He remembered a case in point, in which a bricklayer was proceeding to execute in black brick some shading which was shown on a drawing.

Mr. R. E. Pownall moved a vote of thanks to Mr. Seddon for his paper, and for the admirable display of drawings by which it was illustrated. As to the question of the scale of working drawings, the one advocated by Mr. Seddon, viz., that of three-sixteenths of an inch to a foot, was, to some extent, a novelty, and although a very desirable scale in some respects, it was open to the great objection that it was not one that could be readily read off, with an ordinary foot-rule, and therefore the adoption of such a scale would add to the difficulties of the workman. With regard to the church at Redruth, he thought that granite hardly accorded well with Bath stone, and it would, in his opinion, have been better to have relied on the local material entirely, even at the sacrifice of some of the detail.

Mr. J. Osborne Smith seconded the motion, and observed that the drawings exhibited both the primary conditions essential in a working drawing, viz., clearness and accuracy. Indeed, these two qualities might be said to be all that was wanted in a working drawing. With regard to the new church at Hammersmith, he could

not help feeling gratified that Mr. Seddon had at last condescended to the use of iron in the construction of the roof of that church. At the same time, he regretted that for a London church Mr. Seddon should have used Bath stone externally while marble was used internally. In his judgment, it would have been better to spend the money expended on marble for the interior in Portland or some other good hard stone for the exterior, using Bath stone internally. In our London atmosphere he thought the exterior of the church would be better preserved a hundred years hence if this course had been followed.

Mr. A. B. Pite, in supporting the motion, said that Mr. Seddon was not the first architect of experience and position who had been kind enough to give the Association the benefit of his knowledge. Two sessions ago Mr. William White read a paper,* in which he gave some of the experience he had gained in church building, and that paper, like Mr. Seddon's, was ungrudgingly illustrated by the author's drawings. In looking at Mr. Seddon's drawings one saw that their author was an architect who loved his work. Mr. Seddon had constantly and faithfully devoted his energies to working in one style, and the consequence was that, after many years of a somewhat extended practice, he had acquired a facility in that style which very nearly approached perfection. He thought that young architects might draw from Mr. Seddon's career a very valuable lesson, viz., that success would wait upon those who were diligent and constant in their adherence to one grand principle. Other architects might be named who had achieved eminence in the same way. He trusted that the members of the Architectural Association would take that lesson to heart, and if they did so they would be able, when they had reached the *acme* of their lives, to present to the then Architectural Association, for the edification of their juniors and pupils, such an excellent series of drawings as had been exhibited by Mr. Seddon on the present occasion.

Mr. S. G. Turner, after some remarks with reference to roof construction as illustrated by the drawings, said he had been astonished to hear Mr. Seddon say that he had never used a girder in his life, for it seemed to him (the speaker) that in these days rolled iron girders and joists were necessary, and even indispensable, to the architect. It seemed, however, that Nemesis had overtaken Mr. Seddon by compelling him to use iron for a church roof.

Mr. Hugh Roumieu Gough said that, with regard to the materials used in the Hammersmith Church, he might, as joint architect of the building with Mr. Seddon, say that they regretted very much that they were compelled to use Bath stone at all. It was the only church of any importance with which he had had anything to do in which he had allowed Bath stone to be used at all. As to the use of marble internally, he might say that for structural reasons they were compelled to use some hard stone, and this Belgian marble was nearly as cheap as Portland stone, for it only cost, polished, about 8s. 6d. per foot cube, taking it all round. For the clustered columns † carrying the nave arcade, Bath stone would not carry the weight of the superstructure. Externally it was their wish to have used Mansfield, but the difference of cost between that material and Bath stone amounted to between 4,000*l.* and 5,000*l.*, and the funds available would not allow of the use of the more costly material. The instructions of the committee were to build a church of Kentish rag and Bath stone,—a combination of materials which he abominated. With regard to the use of iron for the roof, it should be observed that all the ironwork of the principals was concealed by the wooden groining. He supposed the time would come when architects would use iron more boldly, and in positions where it could be seen. In the present instance it was fairly and legitimately used, for it was far more economical than wood, while it obviated the necessity of ties, and prevented thrust upon the walls. With regard to the brown Ancaster stone which had been mentioned by Mr. Seddon as being used in the interior of the church, he believed it was the first time that material had been used as a walling stone. This Brown bed lay deep in the quarries, and used to be known as the Corn Grit. It had until lately very little market in London, and very little even in Lincolnshire. It varied from a rich red to browns and yellows; no two blocks were precisely alike in colour, and its effect in mass was very rich. It was a very cheap walling stone, and he hoped to see it more extensively used.

The Chairman having put the motion, it was carried with much applause.

Mr. Seddon, in acknowledgment, thanked the members for the kindness with which they had received his paper, and entered into a brief explanation of the construction of some of the roofs, as to which questions had been asked.

The meeting then terminated.

* See *Builder*, vol. xl., p. 319.

† Our view shows the cylindrical shafts of stone as originally proposed.

EDINBURGH ARCHITECTURAL ASSOCIATION.

A meeting of this society was held on the 22nd ult., the president, Mr. David MacGibbon, in the chair.

Before proceeding to the business of the evening, the Chairman said the society was called upon to express its deep regret at the death of Mr. James Lorimer, who had been one of its most prominent members, and had aided in all circumstances with his good advice and his best wishes. He proposed that they should minute their sense of the loss the society had sustained. This was agreed to.

From minutes subsequently read, it appeared that arrangements for the proposed exhibition were being pushed forward, the date of opening having been fixed for the 22nd of December, as already stated in the *Builder*. Of the 100*l.* considered necessary as a guarantee fund, 95*l.* had been subscribed. The Chairman said everything looked very well indeed for the success of the exhibition.

Professor Baldwin Brown then proceeded to read a paper on the "Mosaics of Ravenna." The Professor, in the outset, pointed out the importance of the mosaics in question as the finest existing examples of the style of art commonly called Byzantine, and went on to describe the special characteristics of this art as compared with that of the periods which preceded and came after it. The art of the Catacombs, he remarked, was of a slight and playful character, making large use of classical forms of decoration, and dealing with specially Christian themes mainly through symbols. The art of the Byzantine period, when the Church became a recognised power in the world, was of a monumental character, presenting to the congregation the impressive forms of Christ and of the saints. The Middle Ages proper introduced more dramatic force and pathos into the representations, and took up subjects like the Crucifixion and the Last Judgment, unknown in the earlier periods. Passing to Ravenna itself, Professor Baldwin Brown sketched briefly the history of the city, and mentioned the three periods to which the best mosaics belonged, answering respectively to the times of Galla Placidia, of Theodoric the Goth, and of Justinian. Some of the principal mosaics were then described in chronological order, stress being laid upon the admirable arrangement shown in the works, and upon their decorative as well as their pictorial excellence. Photographs were exhibited showing the design of some of the more important mosaics, and their relation to their surroundings.

At the close, a cordial vote of thanks was accorded to Professor Baldwin Brown.

SOME UNRECOGNISED POINTS IN DRAINAGE.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

At a meeting of this Society, held at No. 1, Adam-street, Adelphi, on November 17th, the President, Dr. J. W. Tripe, in the chair, a paper was read by Mr. Rogers Field, M. Inst. C.E., on "Certain less recognised, but highly important, Points in the Drainage and Ventilation of Houses," of which the following is an abstract.

Three sanitary principles govern house drainage, these are:—

1. All refuse matter must be completely and rapidly removed from the house.

2. There must never be any passage of air from the drains or waste-pipes into the house.

3. There must be no connexion between the drains and the domestic water-supply.

These, although so simple, are very frequently neglected; the first goes absolutely to the root of sanitation, for were it strictly complied with there would be no leaky drains, no polluted subsoil, and no production of foul gases in the drains from decomposing organic matter. There cannot be a greater mistake than to assume, as is commonly done in investigating drainage, that if water runs away with freedom, this is all that is required; numerous cases are on record where the sewage from houses has apparently run away freely for years, but where the greater portion of it has really been leaking out of the drain into the ground under or close to the house.

In illustration of this point, the author quoted two cases in his own practice, one in which the connexion with the sewer was actually found to be blocked with shavings, which had been left in when the house was built three years before; the other, that of a school in which the drainage from the lavatories had leaked through disused drains under the floor of a large portion of the building, and where, although there was a mass of filth in some places 7 ft. deep, no leakage had been suspected.

If the drains are exposed and found clean, and jointed with cement, this is not sufficient; the tops of the joints may be good and the bottoms bad. The only safe method is to actually test the drains by plugging them at the lower end and filling them with water; very few house drains, indeed, stand this test.

Even if the drains are outside the house, it is a mistake to assume that it is unimportant whether they are sound, for not only may sewage leak out out of faulty joints and percolate under the house, but foul air may be drawn into the house.

It is important to realise how small an amount of deposit will create mischief by decomposing and generating foul gases; a mere irregularity of the joints, even when the drain has a good fall, is sufficient to cause this. There is no better test of the condition of the drains than the amount of smell emitted from a ventilating opening, for if the drains be properly laid and in thorough working order, practically no smell should exist.

Faulty forms of traps and water-closet apparatus were strongly condemned by the author, and diagrams descriptive of good and bad closets were exhibited.

The principle that there should never be any passage of air from the drains or waste-pipes into the house was then considered, and the means of isolating the house-drains from the public sewer, the necessity of keeping the drains outside the house, their ventilation as well as that of the soil-pipes, the position of the water-closets, the disconnexion of the sanitary fittings inside the house from the drains, were referred to. It was insisted that the danger should be guarded against of trusting too much to those parts of the drainage of a house which are visible as an index of the condition of other and important parts which are concealed, and an instance was mentioned of a house the drainage of which had been recently reconstructed, and where all the sanitary arrangements appeared, at first sight, to be perfect, but where a subsequent examination of the drains which were under the house showed that the joints were, in many places, defective, and at one point the pipes were not jointed at all, but a space left large enough to put a hand in, though it was stated that special care had been taken to make the drains watertight. Old drains, which had no outlet, connected with gullies, were found beneath the passages and rooms; the housemaid nearly died of typhoid fever, and beneath the room she occupied was found an old drain with a large amount of foul deposit. A long list of other defects was described, leading to the conclusion that the drainage, instead of being very good, was really so radically defective throughout that it was necessary to reconstruct the whole of it.

Another instance was given in which a lady and her cook were attacked with erysipelas and blood-poisoning shortly after occupying a house. Various alterations were made in the drainage in the absence of the family, but on their return the lady was again attacked with erysipelas, and shortly after other members of the household. Again alterations were made, and again the lady was attacked with erysipelas, and the housemaid with typhoid fever. An examination of the house by the author showed that an old stoneware drain in the scullery, into which the sink formerly discharged, before it was disconnected, had not been removed, and, though stopped with cement, the stopping was

imperfect, thus allowing the air of the drain to enter the house.

The author next considered the various ways in which foul air from faulty drainage inside the house passes to different parts, and pointed out the opportunities which were given for the passage of air from one part of a house to another, depending chiefly upon windows and fires, the latter, of course, mainly acting by drawing air through passages, staircases, and doors. But other channels must also be borne in mind, and an interesting account was given of the passage of foul air along bell-wire tubes, the proximity of the bell-pull to the fireplace giving an increased opportunity for air to be drawn from a distance to this part of a room. Channels for gas-pipes and for hot-water pipes also not uncommonly give facility for the admission of foul air. In connexion with this part of the subject a remarkable instance was given of a particular bed in a school, the occupants of which were constantly the subjects of slight attacks of pneumonia, with tendency to typhoid. In this case the foul air was conducted from a lavatory where there was defective drainage, up a staircase, and impinging on the ceiling of the dormitory, was reflected on to the bed where the sickness occurred.

An interesting account was given of the cause of the Duchess of Connaught's recent illness. Defective drainage was found in the basement of the house, and after numerous experiments, the means by which the foul air entered the Duchess's bedroom were discovered. These showed that it was only when occupying certain positions in the room that she would be exposed to the influence of the foul air, while in bed she would escape. As a matter of fact, in twenty-four hours after sitting on a sofa in one of these exposed positions her Royal Highness's symptoms fully developed themselves.

The necessity of a thorough disconnexion between the drains and the domestic water-supply was then dwelt upon, and the mistakes most commonly made in this particular pointed out.

In the discussion which followed, the President, Dr. Buchanan, Dr. de Chaumont, Dr. Corfield, Mr. E. C. Robins, Dr. Bate, Mr. Jacob, Dr. Rogers, Dr. Poore, and Mr. Shirley Murphy took part.

THE CONSUMPTION OF SMOKE.

LIVERPOOL ENGINEERING SOCIETY.

AT a meeting of the above society, held on the 22nd inst. at the Royal Institution, Colquitt-street, Mr. H. Bramall, vice-president, in the chair, a paper was read by Mr. W. E. Mills, entitled "Notes on the Mallett System of Controlled Combustion." The author, in introducing his subject, stated that the question of dealing with the cloud of smoke hanging over our large cities, and the immense waste of heat which its presence testified to, had been attempted in many ways from time to time. All engineers were familiar with the different kinds of smoke-consumers and fuel-economisers which were before the public, but none of which altogether achieved the end aimed at, viz., the consumption of the smoke generated by the fuel in the furnace. Mr. Mallett, of Denver Colorado, U.S.A., who had studied the subject, saw that the difficulty with all the smoke-consumers was the impossibility of entirely burning all the atoms of carbon set free in the act of combustion. He conceived the idea that if by any means the fuel could be burned in such a manner as not to produce any smoke at all, and so preserve all the heat which would be otherwise wasted, a great step would be gained. He effected this in the following manner: a combustion-chamber is fitted behind the boiler-furnace, communicating with it by a perforated septum wall. The fire-bars were made hollow, and so arranged that cold air from the exterior could pass through them into the combustion-chamber. The open ends of these fire-bars could be closed by a slide, worked by a lever, which also actuated the apertures in the ashpit-doors. When coal was first put on the fire, the latter openings were closed. The gases given off from the fuel passed into the combustion-chamber through the apertures in the septum wall, and meeting there with the oxygen conveyed through the fire-bars, were entirely consumed. The inventor claims that by his method, no smoke being produced, all chimneys may be done away with, and a saving of about 45 per cent. in fuel effected. The necessary draught is provided by a fan, which draws the heated gases, the ultimate products of combustion, through a condenser, in which they are cooled down, and then discharged into the open air. The application of the system to stationary, marine, and locomotive boilers was next described, with the various scientific principles involved.

A discussion followed; and a vote of thanks was accorded to the author.

THE SMOKE NUISANCE.

THE question that most directly affects us who are acquainted with a particular grievance is that of the smoke nuisance. Most laudably it has been attempted by a committee of noblemen and gentlemen to devise means to get at the best and most practicable appliances that would be likely to mitigate the evil. The great movement inaugurated by the late Exhibition at South Kensington, and previously that by the Kyrle Society, must not be allowed to collapse. It has been demonstrated that a better state of things is possible, that coal may be burned, even in the open fire-grate, without producing smoke. Although the manner of doing it may not be so simple as to recommend it for general adoption, it has been sufficient to prove the fact. The manufacturers are sure to improve and ultimately perfect any appliance that is in the right direction, if they can rely upon receiving encouragement from the purchasing public, and those whose position in society authorises them to influence the owners of house properties.

Closely allied to the smoke-abatement question is the smoky chimney nuisance. With the former, grates must be used that produce a minimum of smoke; and with the latter the nuisance will partially disappear by using ventilating grates and Tobin's tubes. But my object in writing to you is not to attempt to say anything new to the readers of the *Builder*, for many, if not most, of them know already that chimney-pots and cowls are seldom really necessary. I can mention now, further, that these unsightly additions to the tops of the chimneys, as seen, say, in the neighbourhood of Park-lane, Brook-street, and the Bayswater-road, are not through the architect's recommendations, but through the decorator or jobbing builder,—introduced, perhaps, by one of the upper servants or the steward of the mansion. It does seem a pity that these dangerous and hideous appendages should be allowed to exist if they are not necessary. That they are not necessary, I make this bold and sweeping assertion; but, as I said before, the architects cannot help it. They are not consulted. Those only are consulted whose interest it is to get a little job to do, and they no doubt ignorantly introduce one of the many plausible advertisements of patent chimney-pots that will be "sure to be effective" (?). The gentleman having already found him to be a respectable and honest sort of a man as a shaker of his carpets or a cleaner of his windows, thinks he may as well get the pot and put it on as to get a stranger into his house. Hence the chimney-pots multiply.

In getting this evil checked and ultimately entirely put a stop to, it will be necessary to get at the proprietors of these large dwellings, and interest them in the question, and perhaps define a few simple rules by which they will be able to convince themselves whether it is not practicable to do without chimney-pots and cowls; for example, a grate suitable for one room is not necessarily suitable for all the rooms. Ascertain whether there is any tendency for a down-draught without a fire in the room; if so, see, by holding a lighted match to the keyhole or joint of the door or doors, to which direction the draught inclines, — if outward, which is generally the case, the chimney is being used as a descending-flue, to supply air to some adjoining hall or room, consequently a fresh supply of air (warmed preferred) in the hall or room next to the one with a down-draught will immediately change the currents, and cause that which before had been a descending-flue to be a good drawing chimney. Should there be no direct down-draught, and but a very sluggish up-draught, this evil may be got rid of by using a ventilating grate, slow-combustion grate, or "Tobin's tubes." One general remark. It would be a good system if every room of a new building were tested as to the inclination of the flues before a stove or grate were selected. This to be done first without fires, and then with fires on the hearths.

ROBT. CRANE.

EMPLOYMENT OF A CRANE IN EARTH CONSTRUCTIONS.

IN the works connected with the raising of the level of the feeding basin of the Rhine, Marne, and Saar Canal at Gondrexange, in Lorraine, the contractors have made what, on the Continent, is spoken of as a novel application of the crane. The embankment surrounding the basin had to be raised by about 4 ft. 6 in. and the idea of availing themselves of machinery in carrying out the work was first suggested to Messrs. Weis & Bernatz, the contractors, by the fact that the wages for hand labour in that part of the country are relatively very high. They found that the quantity of clay which they had to convey from the boats to its place on the embankment would amount to not less than 100,000 cubic mètres, in addition to which they had 20,000 cubic mètres of stone to unship. They accordingly sought for a suitable crane, and obtained one from the works of Messrs. Booth Bros., of Rodley, near Leeds. They had the crane fixed on a bridge, placed upon two pontoons lying one behind the other, and by its help they were able to lift the clay and stone directly out of the boats and deposit them at once on the spot where they were required. The distance over which it was necessary for the crane to reach in this process of unlading was unusually great. A suitable machine, however, was obtained at a cost of 400*l*. It has an arm with a reach of over 45 ft. The crane is made of American pitch pine, and it is capable of lifting over the maximum radius a weight of fully three tons. The pontoons on which the crane is fixed are able to bear a weight of thirty tons. The hinder pontoon is used as a counterpoise, and is loaded with ballast to such an extent that in the manipulation of the arm of the crane the deviations in depth never exceed 8 in. Another point is that the crane is capable of being turned round so as to reach over three-fourths of a circle, or 270°. The engine employed in driving the crane works with two cylinders, and by means of a break the load can be stopped and held fast at any height. The boiler is certified up to a pressure of six and a half atmospheres. From 3½ to 4 atmospheres' pressure suffices for the lifting of three tons. The clay employed on the work is brought by river in barges. These are each divided into four parts, each containing a large chest or box, capable of being lifted out. At the outer extremity of the arm of the crane is a chain, with four end chains terminating in a hook, and each hook fastens in an iron handle or catch in each of the chests. When the chest or box is lifted, the crane begins to revolve, so that the load in passing from the vessel to the shore moves in a spiral line. Some difficulty was met with at first in letting the clay out of the box. It was found impracticable to make the bottom of the box into a drop door, as the recoil in such an arrangement was found to act injuriously on the crane itself, owing to the too sudden difference of weight and pressure. This difficulty was overcome by an arrangement whereby one of the sides was gradually raised while the box was being raised and tipped on one side. The process of lifting out a box, emptying it, and putting it back in its place, does not occupy more than a couple of minutes. By help of the crane it was, therefore, found possible to unload sixty barges, each carrying ten tons of clay, per day. The difference of cost made by the use of the crane was enormous, as it was found that instead of fifty men at 3s. 6d. to 4s. a day, only five altogether, including stoker and engineman, were required to do the work, the outlay for coal being about 6s. a day.

Surveyors' Institution.—The next meeting will be held on Monday, December 4th. In view of important changes now in progress in the methods of producing the published maps of the Ordnance Survey, the time is considered opportune for the expression of the opinions of the members with reference to any practical defects or possible improvements in the maps in question. It is believed that any well-considered suggestions will be acceptable to the Director-General of the Survey, and the Council have, therefore, arranged for the reading of an introductory paper (to be followed by a discussion) at the above meeting upon the subject of "The Ordnance Maps, and Suggestions for their Improvement."

OPENING OF THE NEW TOWN HALL AT LEYTON.

The rapid expansion of Leyton, which is increasing in population at a rate almost unprecedented, has rendered necessary the erection of a new public hall and offices for the transaction of the business of the district, and for some time past a new town-hall has been in course of erection. The building, having been completed, has been opened for business. It has been erected on a site near the railway station, said to be about the centre of the extensive district within the area of the local board. The building is three stories in height, and has two bold and handsome main frontages, with a tower upwards of 80 ft. in height, at the east angle, under which is the principal entrance into the building. The two principal frontages, —the one to the north-east, facing the Leyton-road, and the other facing the south,—are each about 70 ft. in length, the materials being white Suffolk brick, with a profusion of Portland stone for window dressings and general ornamentation. The entrance at the angular frontage, under the tower, is surmounted by a carved and moulded pediment in Portland stone, supported by piers with richly-carved capitals. The first floor of the south frontage has two lofty and ornamental two-light pediment windows, by which the principal apartment in the building,—the large hall or board-room,—is mainly lighted. A forecourt in front of the two elevations, about 12 ft. in depth, is enclosed by a dwarf wall, surmounted by ornamental railings.

The entrance to the building leads into a spacious hall or vestibule. The ground-floor contains the clerks' office, together with the offices of the assistant clerks; also a spacious committee.room, handsomely fitted and furnished; the surveyor's office, and those of his clerks; and the offices of the inspector of nuisances and the collectors. A wide stone staircase leads to the upper floors. The board-room on the first floor is 50 ft. in length, by 32 ft. in width, and is 25 ft. in height. It has an elegantly-decorated coved ceiling, divided into panels, the coved portion of the ceiling springing from a moulded cornice.

Mr. J. M. Knight, the surveyor for the Mile-end Vestry, is the architect of the building, and Mr. James Read, of Walthamstow, is the contractor. The cost of the building is 6,500*l*.

THE MANHOLE SCARE.

The outcry against the system of open ventilation of the public sewers into the centre of the carriage-ways lately raised, has had a powerful effect in alarming the minds of the general public, whose confidence in such matters is based on the opinions of experts. Its example has caused medical officers of health to be so bold in their statements concerning the evils arising from the gases escaping from the manholes, that the average member of the community half believes that the sewerage systems of our best towns, instead of being the means of carrying disease away from our homes, are actually the carriers of it to our very doors.

The Medical Officer of Health for the parish of Chiswick startled his Board a few weeks ago by stating that he knew of no other cause for a case of enteric fever in the parish than the exhalations from the manhole-ventilator in the street where it occurred. The Board promptly ordered an inquiry into the case, with a view to knowing whether their sewerage system, just completed at a cost of nearly 80,000*l*., was really a means of distributing disease and perhaps death. Dr. Corfield, Professor of Hygiene in University College, was called in, and has presented his report on the case. The manhole-ventilator alleged to be the cause was about 40 ft. from the house in which the case occurred. Inside the house he found that the scullery sink-stone was connected directly to the sewer, and that the only protection from the inrush of gas into the house from it, was a small bell-trap with a water-seal of at most ¼ in. When he removed the top of the trap, and held a lighted wax match over the mouth, the indraught was sufficiently powerful to cause the flame to flicker violently. He further found that the water service was intermittent, and that one cistern alone supplied the water-closet and the taps inside the house. He stated that, in his opinion, the disease was more probably caused by the sanitary defects inside the house than by the exhalations from the manhole. In this moderate opinion, experts will join. In such a case comment is needless. We will only venture to say that it raises in the mind an uneasy suspicion that medical men look upon the manholes as a cause to which they can refer every case presenting a difficulty of explanation, or in which they are too careless to make diligent search for the real cause.

Watchful.

FORESTS AND HAILSTORMS.

Sir,—An article under the above heading appeared in the *Globe*, on the 15th inst., in reference to the influence of forests in the prevention of hailstorms, and observations by Herr Riniker, the chief forester of Canton Aargau, Switzerland, are referred to in support of that theory. The subject is interesting, and perhaps the following remarks on the article and the question generally of the formation of hailstones may be acceptable for your columns. That forests induce an increase of rain is certain, and that they tend to the prevention of hailstorms is almost as much so; but on other points the remarks of Herr Riniker are, I believe, likely to mislead. He speaks of "hail-charged clouds" as if the hailstones were suspended in the clouds; and also of such clouds being very low. In an article in "Science for All," part 34, "On how Hailstones are forged in the Clouds," in reference to their occasional large size and crystalline form, the author (Dr. Mann) says, p. 296:—"A mass of ice, weighing 3 oz. or 4 oz. cannot be poised in the air like a snow-flake, whilst its prisms and pyramids are being fashioned by the slow and delicate process of molecular attraction and adjustment. The hailstones which are precipitated with the force of a projectile from the air must be the creation of an instant, notwithstanding the cunning regularity and methodical order of the lines." I believe that hailstones never fall from a low cloud, but may fall through one, and that the larger hailstones fall from a great height, being at first very small, but increasing in size as they fall by the accumulation of vapour from the atmosphere, and that they take their crystalline form whilst falling. The larger hailstones of these latitudes, *i.e.*, from 1 in. to 2 in. or 3 in. in diameter, have invariably a nucleus of white, opaque, compressed snow-like agglomeration, incased more or less in transparent ice. They are generally of a somewhat flattened spheroidal form, showing that these stones revolve during their fall; and at times crystals of ice are formed around the edge of their greater diameter. Their formation and fall I would account for as follows:—

As water is more than 800 times heavier than the air at sea level, and 3,000 times heavier than air at heights (five or six miles) at which clouds are known to form, it is obvious that no particles of water (vapour) could rise to such heights, or, in fact, to any height, and remain suspended unless by the aid of some buoyant power. This power I believe to be electricity, and there are good proofs of the connexion of electricity with evaporation. On this theory, in evaporation the minute particles of water rise with a charge of electricity in accordance with their own extent of surface and with the electric condition and temperature of the surface from which they rise, and are buoyed up by it to the level of their buoyancy in the atmosphere, until, from the effects of trees, mountains, or a damp and conducting condition of the atmosphere, the surcharge of electricity escapes, and, the buoyancy and mutual repulsion of the particles being thus reduced, they unite and fall as rain or sink to a lower level.

Clouds may thus form at different elevations, according to their electric condition, up to the greatest height at which vapour could float; the lower portion being liable to dissipation from causes as above named, but the more elevated clouds to which I allude are above reach from such causes, and, if away from mountains, could only be affected by thunderstorms or some such phenomena. Thus, we can readily imagine how, under certain meteorological conditions, and especially under those which present themselves in heavy thunderstorms, clouds might become piled up so as to discharge the electricity, by conduction, from vapour at heights far above that of ordinary rains. Under these circumstances, the precipitation would take place at a very low temperature, and in the consequent fall particles would attract particles, and this with increasing force as the aggregation goes on. The snow-like nucleus of the hailstones would thus be formed, and the liquid vapour collected in falling through the lower clouds being frozen by the cold of the nucleus descending from such a height would produce the covering of transparent ice in which hailstones are sometimes enclosed. The occasional formation of large crystals of ice on hailstones may perhaps be due to a partial suspension in their fall from whirlings of the wind, giving the crystals time to form from the deposit of liquid vapour under intense electric influence. The connexion of thunderstorms with hail, and the force with which the latter falls, needs no further explanation.

It is seldom that hail falls in Winter, especially in frosty seasons; and destructive storms, with hail of large size, generally occur in hot weather, after a calm, with more or less of drought, conditions under which it seems probable that the upper air, *i.e.*, as high as vapour could be floatable, would become heavily laden, and ready in case of a thunderstorm for the production of hail in the manner I have described. If this explanation be near the truth, it may readily be seen that forests, from their tendency to produce rain, must be preventive of hailstorms by keeping the lower air in a damp and conducting condition, and thus preventing any excessive accumulation of vapour in the atmosphere above them. The effect of forests as preventive of hailstorms, especially of coniferous trees, the pointed leaves of which attract electricity from surrounding vapour and increases the precipitation of moisture, was brought, by the late Dr. Rolleston, under the consideration of the Royal Geographical Society in a lecture at the evening meeting of May 12th, 1879.

Oxford. G. A. Rowell.

THE STONE QUESTION.

Sir,—It is still a marvellous thing that the stone used in London buildings perishes so quickly. I refer more especially to those buildings which have been erected during recent years, many of which I have observed already show serious symptoms of decay. This state of things is no doubt due to the want of care and experience in selection, and I am of opinion that if proper care were taken in selecting the stone our large buildings would be much more durable than they have hitherto been. Unfortunately this is an age of cheapness, and some people will use soft stone; it is a great mistake, however, to use such stone in the erection of London buildings, especially soft Portland stone. Properly selected Portland stone is the best stone that can be used for London work: of that we have proof when we look at some of the old buildings which have been erected of that stone; but its durability here depends on care in selection.

The brown stone, as I said some years ago, is the best stone that can be used; and I hope, for the benefit of the masons' trade of this country, that the stone will be selected with greater care in the future than in the past; if this is done, greater credit will redound to all engaged in masonry, and less disappointment will be experienced by those gentlemen who spend their lifetime in conceiving and carrying out designs for the approval and benefit of the public.

Frequently when I have been in some of the Bath stone quarries selecting some of the hard material, others have selected very soft; and as there is no doubt that the soft and the thin beds of Bath stone perish most quickly, there is every reason to expect that in a few years hence we shall have a great deal more decay than we have had in past years.

Just a word or two with reference to the red grit stone. I have taken great interest in examining this stone in the neighbourhood where it is obtained, viz., Dumfriesshire and Carlisle, there one can see a great deal of it already perished. I am not in a position to say that this stone is from the same quarries as that which is now sent to London; but I wish to warn stone-buyers against those agents who call upon one with a piece of stone about 1½ in. cube, and represent that this is a sample of the stone they have to dispose of. Very few men are capable of judging from these small pieces whether the stone is good or bad: the proper way is to go to the quarries and examine the strata and the quality of the stone generally;

by so doing one may be able to select stone that will stand the weather.

Corsehill stone is a stone which has been used extensively in London, and if carefully selected from the best strata will stand the weather well. There are, however, some inferior stones in this quarry, but generally speaking I may say that it is a durable stone.

Yorkshire stone is frequently described in specifications without any quarry being named, yet the number of quarries in Yorkshire is too numerous to be mentioned here. This is a very important matter, for the difference between the hard and the soft York is just double the cost in working. Soft York, moreover, is of an inferior quality, and perishes with the frost, while the sun will even lift up the small laminated beds.

Caen stone has caused much disappointment to a great number of people. Many buildings erected of this stone are very nearly perished owing to atmospheric influences, the stone crumbling away like so much dry sand, and being blown away by the wind. I have noticed that it is chiefly the yellow and soft stone which decays thus, there being no silica to bind the particles together. One bed of this stone, which is of a grey colour, is as hard as Portland and very close in texture. This bed, I have noticed, stands remarkably well; in fact, equal to any stone we have in London. Where a building is erected entirely out of this, there is no doubt of its standing the weather well.

In conclusion, I may say that I have thrown out these few observations in order that those engaged in the buying and working of stone may take a little more interest in the important matter of selection, so that the masonry of this country may not be disgraced owing to the use of bad material in our buildings.

WILLIAM CROSS.

SCULPTURED STONES OF THE SAXON PERIOD.

CAMBRIDGE ANTIQUARIAN SOCIETY.

AT a meeting of this society, on the 20th ult., the Rev. R. Burn, M.A., President, in the chair, the secretary exhibited, on the part of the Rev. C. B. Drake, Rector of Teversham, drawings of some trefoil tracery, at the back and sides of the easternmost of the three sedilia in Teversham Church. It appeared to have been covered up in the so-called restoration of the church some twenty years ago; and had been brought to light again a few weeks since. The patterns on the walls were repeated thrice, but were not precisely identical. The work was that of the fifteenth century. Between the sedilia were slender shafts, ending in capitals. On the capitals could be felt mortise-holes, indicating the existence at some-time of small statues. The width between the sedilia was not the same throughout, the innermost one being 1 ft. 6 in. in width. The other two were 1 ft. 11¼ in. wide. The easternmost one appeared to have been surmounted by a lofty finial, of which only a portion of the shaft remained. There were other features of interest in the church besides the sedilia.

The Rev. G. F. Browne then proceeded to give a lecture,—illustrated by a number of drawings and tracings,—upon sculptured stones and crosses of the Saxon period in the north of England (Bewcastle, Gosforth, Hexham, Ilkley. Lastingham, Leeds, Ruthwell, Whalley, &c.), The lecturer said (we quote from the report in the *Cambridge Chronicle*) he felt some difficulty from the fact that any one of the places named would supply him with sufficient material for one lecture. His object was, however, to bring home to the minds of Cambridge antiquaries, more than had been done hitherto, the considerable number and very great importance of this group of sculptured stones. The great stones of Scotland, those of the Isle of Man, and of Ireland, and those of Wales, had books to themselves recording their description and history. But the ancient stones of England had no book of their own, and yet, as far as he could make out from a comparative study of the subject, there was no group of stones which spoke to them in the way in which they could make these English stones speak. He would first take them to Bewcastle, in the wilds of Cumberland, the place where Dandie Dinmont was attacked by the robbers. In ancient times Bewcastle was a very important place, an outpost of the Roman wall, and when the frontier shifted from east and west to north and south, Bewcastle remained on the border-line, being, as it were, a sort of pivot. It was, no doubt, a very important station in Roman times. Here was a very magnificent column, 14 ft. 6 in. in height. On one side were three panels, with figures, and a fourth panel filled with runes. On the west side there was interlacing work, of which he showed a specimen from the wonderful cross of Myredach, in Ireland. On another side there was, besides these interlacing panels, a very long one of simple chequers, the only instance he knew of a large panel of chequers. Two hundred years ago the Runic inscription on the column was very obscure, but now it was as clear as possible. The inscription stated that the column was put up in the reign of a certain King Egfrith, in memory of a certain King Alchfrith. That represented the patron of Wilfrid, who first established him in ecclesiastical position, by giving him Ripon, and who died in 664. There was inscribed in the very boldest characters the words "Christ Jesus." There were also on the column letters giving the name of Alchfrith's queen, and the queen's sister and brother-in-law. Mr. Browne next noticed a cross, 17 ft. 6 in. high, at Ruthwell, in Dumfriesshire, which was, no doubt, an Anglian cross, put up when Dumfries was in the possession of the Anglians. At the time of the Reformation the General Assembly ordered that it be taken down as being idolatrous. It was knocked down, but, fortunately, preserved in the church. About 100 years ago it was turned out, and it decayed considerably, but was now taken care of, standing in the minister's garden. One figure on it was no doubt St. John with the Lamb. Two other figures could not be made out. Another figure was that of Our Lord in the attitude of blessing. There were several other figures surrounded by inscriptions in Roman characters; one was supposed to refer to a passage in the life of St. Anthony, when he and Paul the Hermit brake bread. On the other side of the cross were similar panels, and then most exquisite scrolls. On this cross there was no interlacing work at all, and that of course made them ask what could have been its origin, for almost all stones in the north had the same sort of interlacing work, which was found also on the Irish crosses. There could be no doubt that this cross represented the Roman view of ornament, and that the interlacing work represented the Keltic view. He had seen it stated that Roman books were sent over to England by Pope Gregory who, having no artists for illuminating, had to employ a Keltic scribe, a book thus illustrated being sent over to Augustine of Canterbury. But this was a great mistake. Of the two MSS. in Corpus Library, that which was no doubt of the Augustinian epoch had no interlacing work, while the one ornamented with interlacing work was of the seventh century. This cross was covered on the alternate sides with runes, which could still be read. It was quite possible for a casual visitor to look at it and not know that he was looking at a large inscription. The history of these runes was the most interesting in literary discovery. Mr. Browne gave the different readings of the Runic characters which had been made out by Kemble and others. Kemble came to the conclusion that there was a very beautiful Anglo-Saxon poem engraved on this cross. About that time an Anglo-Saxon manuscript was discovered at Milan, which the Master of the Rolls had copied and printed. It came into Kemble's hands, and he suddenly found the lines which he had deciphered from the runes on the cross. Then he looked through the poem and saw that in it was every stanza which he had found on the cross. There was another most remarkable cross,—that of Gosforth,—with regard to which it was not too much to say that this year had seen a revelation of the language of these stones which no one had dreamed of before. Gosforth was not far from Wastdale. In the course of this year in examining some of the Scotch stones, he had come to the conclusion that it was quite possible that scenes from the *sagas* might be represented on some of these stones. Mr. Browne explained how the figures on several of these crosses had been discovered to be illustrative of Scandinavian legends. One figure represented Christ on the cross, and two curved lines from one side represented, one line the water and the other line the blood issuing from his side. Another figure represented Mary Magdalene, and it was very remarkable that the ointment-box she was represented as holding was in the true shape of an *alabastron* or a cucumber-shaped box, which was snapped across the middle when it was intended to use the ointment it contained. It was by some accident the Scandinavians had got hold of that detail so correctly. The dreadful serpent-like figure depicted up the middle of the cross was opening its mouth at the Trinity, emblematically represented immediately above. In reference to the Ilkley stones, Mr. Browne said they were of course well known to a great many; but he had never seen a real investigation of them. He did not think they would find anywhere more exquisite scrolls over crosses than were on those. The boldness of design and the symmetry of the scroll were beautiful beyond description. On one cross St. John was represented, with the beak and eyes of an eagle. On some crosses were figures of beasts holding up one paw in an attitude of obedience, the object of the design being to show the power which Christ had over those evil spirits represented in early times by these dragons. He thought these stones would repay more consideration than they had yet received. There were some very remarkable stones at Otley. At Collingham were portions of three beautiful crosses. Mr. Browne pointed out drawings of a Keltic cross, dug up at Tadcaster, on the stem of which were symmetrically inscribed a series of circles,—representing the consecrated wafers, with one larger circle representing the wafer used by the celebrant. Mr. Brown next noticed a Saxon tombstone at Thornhill, near Dewsbury, and a very remarkable cross 14 ft. 6 in. high, now preserved in the chancel of Leeds parish church. Professor Stevens, of Copenhagen, agreed with him in his interpretation of the curious design upon this cross, representing Völund carrying off a "Swan-maiden"; such a panel did not exist elsewhere in the whole world. Another panel from Leeds had interlacing work for its pattern. There were thirty interlacings, supposed to correspond with the days of the months. The four divisions of the pattern were supposed to represent the four seasons, while measurements made showed that a line produced diagonally through one upper corner of the oblong would strike the Pole Star, while one produced through the other upper corner would strike the Sun at Leeds at noon. Mr. Browne also gave interesting details about crosses at Hexham, Lastingham, Sinnington, and Kirkdale. In conclusion, he urged that something should be done to record the description of these stones in a book. They were being found in considerable numbers, and those at Gosforth furnished nothing less than a revelation. He thought the University might very well undertake such a task. Everything in the way of Greek or Roman art was represented in this University, and they had in this Society a great centre of enthusiasm. These crosses and stones showed them that their Saxon ancestors possessed a skill of execution and fertility of design which might make us very proud to call them our fathers.

In the course of the discussion which followed, the Rev. Dr. Luard said he thought the Society might, among other things, interfere to prevent an act of Vandalism which, according to the newspapers, was threatened at Sawston by the utilisation of a cross of Barnack stone standing in the middle of the village for the purposes of a lamp-post.

The Chairman assured Dr. Luard that the Society had already done so, and that the monument had been saved.

A vote of thanks was given to Mr. Browne for his lecture.

AN AMERICAN ARTIST'S MANSION BURNED.

AMERICAN papers of the 11th ult. give details of the destruction by fire, on the previous day, of the residence and out-buildings of Mr. Albert Bierstadt, artist, situated at Irvington, on the Hudson. The house was built by Mr. Bierstadt as a summer residence, and is known as "Malkasten," or "Painter's Box." The house was square and built of stone, with four stories and high ceilings. It was erected about seventeen years ago, and its cost and that of the land together was about $10,000. The loss is estimated at $60,000, and is pushed up to the figure by the immense number of sketches which Mr. Bierstadt had stored there, in large part, of California scenes. Mr. Bierstadt, it seems, had not lived in the house for the past seven years. The most recent occupant was Mr. Henry T. Chapman, jun.

a broker of New York, residing in Brooklyn. Another account says that the building was erected at a cost of 100,000 dols. A studio, 75 ft. by 50 ft., with a ceiling 35 ft. high, was situated in the rear of the second story. All the rooms were spacious. The interior was finished in hard woods. Large Turkish rugs took the place of carpets. The furniture was costly. Nearly every room contained from three to ten valuable pictures of the famous artist. In the library were two pictures of Yosemite valley, valued at $10,000 each. The furniture itself was probably worth $10,000. The pictures and curiosities are estimated to have been worth nearly $100,000 more. These two accounts appear to show a discrepancy of $90,000 as to the cost of the building, and one of $50,000 as to the amount of loss sustained.

YORK ARCHITECTURAL ASSOCIATION.

The project of forming an Architectural Association in York has been successfully floated. The first general meeting was held on Thursday evening last week. Mr. Wm. Brown, architect, presided, when the rules were brought forward, and were, with a few slight alterations, finally adopted. The preliminary arrangements have been energetically carried out by Messrs. Braithwaite, Crunnack, Hepper, Smithson, Yeomans, Smith, Burleigh, Benson, and Tate, with Mr. B. P. Shires as hon. sec.

The first meeting will be held on Dec. 21st, in the lecture-room of the Association, Victoria Hall, Goodramgate, York, upon which occasion Mr. J. Perry will read a paper on "The Present Aspect of Architecture in England."

Elementary and advanced classes of design and construction are being formed, and it is to be hoped the committee's efforts will be rewarded with success, as the new association will supply a long-felt want in the district.

BUILDERS' BENEVOLENT INSTITUTION.

The fifty-eighth election of pensioners on the funds of this Institution took place on Thursday last at Willis's Rooms, Mr. Jno. T. Chappell, President, in the chair. There were six candidates,—five men and one woman, viz., Charles Wood, aged 60 (second application); Robert John Dutton, aged 72 (second application); Francis Drake, aged 67; William Mansell, aged 64; Edward Bagridge, aged 60; and Martha Attwood (widow of James Samson Attwood), aged 72. When the election was arranged for, there were vacancies for two men and one woman, but in consequence of the great success of the recent anniversary festival, the committee decided to elect an additionl candidate. The poll was open from two p.m. to four p.m., and shortly after the latter hour the scrutineers (Messrs. Thomas Stirling and T. F. Rider) announced the results of the voting to be as follow:—Drake, 1,794; Dutton, 1,019; Wood, 804; Bagridge, 170; Mansell, 132; and Mrs. Attwood, 43. The chairman therefore declared the successful candidates to be Francis Drake, Robert John Dutton, Charles Wood, and Martha Attwood.

On the motion of Mr. T. G. Smith, seconded by Mr. Rider, a vote of thanks was given to the chairman, who was congratulated upon the fact that owing to the success of his exertions in connexion with the recent anniversary, the committee were in a position to elect an additional candidate. Votes of thanks were also given to the scrutineers and checkers of votes.

The Central Hall of the Houses of Parliament.—Mr. Schreiber, M.P., writes to say that in answer to his question as to what steps the First Commissioner of Works intended to take next session for completing the decoration of the Central Hall, Mr. Shaw-Lefevre was understood to say that he thought it improbable any steps would be taken in that direction. So far as he (Mr. Shaw-Lefevre) could make out, the existing decorations had not given satisfaction, and he did not think the House would wish them to be continued. Upon this Mr. Schreiber gave notice that early next session, unless prevented by the new rules, he should call attention to the continued exclusion of three out of the four national saints,—meaning, of course, St. Patrick, St. Andrew, and St. David,—from their places in the central hall, and move a resolution in favour of their admission.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

5,496. S. Slater, Oldham. Stoves. Nov. 18, 1882.

5,508. L. A. Groth, London. Producing architectural ornaments, &c. (Com. by C. G. Mineur, Stockholm). Nov. 20, 1882.

5,528. E. B. Brooke, Huddersfield. Removing superfluous body and glaze off enamelled bricks and tiles. Nov. 21, 1882.

5,581. E. Hughes, Liverpool. Wood block and other pavements. Nov. 23, 1882.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

Nov. 21, 1882.

4,951. J. M. Hart, London. Automatic registering apparatus for closed doors, &c. Oct. 18, 1882.

Nov. 24, 1882.

3,511. W. Wright, Plymouth. Flush cisterns. July 24, 1882.

3,737. B. J. B. Mills, London. Ceramic composition. (Com. by F. Gillet, Paris.) Aug. 5, 1882.

ABRIDGMENTS OF SPECIFICATIONS

Published during the Week ending November 25, 1882.

1,432. W. Bartholomew, London. Flushing tanks. March 24, 1881. Price 6d.

A pipe rises through the bottom of the tank which has a trumpet-mouth. Over this is a bell, which acts as the short leg of the syphon. The pipe terminates in a trumpet-mouth dipping into a box, from which is the outlet to the drain. When the tank is filled a syphonic action is established.

1,749. C. Major, Bridgwater. Roofing tiles. April 12, 1882. Price 6d.

These tiles are constructed with serrated or step-like bodies.

1,785. T. Rowan, London. Ventilating apparatus. April 14, 1882. Price 6d.

This is an improvement on Patents Nos. 5,303 of 1880, 162 of 1881, 505 of 1881, and 5,351 of 1881, in dispensing with cowls for producing the current of air, and fitting a stove through which passes a series of pipes connected with the sewer or drain, &c., while their other ends open into the up-shaft or chimney. By the heat of this stove the current is produced.

1,792. A. W. L. Reddie, London. Ventilators. (Com. by A. Huber, Cologne.) April 14, 1882. Price 8d.

A vertical shaft of tapering form is fitted at its upper end with a truncated pyramid, having five sides and independent upright wind-boards.

1,828. A Smith, Huddersfield. Appliance for securing sliding window sashes. April 17, 1882. Price 2d.

A counterbalanced lever is attached to the lower style, the heavy end of which comes in contact with the upper style. (*Pro. Pro.*)

1,836. W. Walker, New York, U.S.A. Manufacture of artificial stone. April 18, 1882. Price 6d.

The stone is made of sand, cement, sulphur, and potash, and the blocks are hardened by being placed in a chamber and subjected to the action of steam which has been passed through a mass of sulphur.

1,857. W. Blyth, Barton. Manufacture of bricks and tiles. April 18, 1882. Price 4d.

These are pressed in dies, and finished off by hand.

2,047. W. W. Wynne, London. Bridges. May 1, 1882. Price 6d.

To allow the passage of vessels through bridges a portion of the bridge is constructed to be lowered into the water so that the vessel can pass over it.

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

FALL OF TWO RAILWAY BRIDGES.

On the morning of the 24th ult. seven men lost their lives by the fall of a "cross-over bridge" on the London, Chatham, and Dover Railway, near Bromley, the poor fellows whose lives were thus sacrificed being servants of the company. The bridge which fell was an old brick-built one, about a quarter of a mile beyond Bromley station from London, and is stated to have been erected when the line between Bromley and Bickley was in the hands of the South-Eastern Railway Company. It connected private property on both sides of the line, and was for private use only. The London, Chatham, and Dover Company had been employing men in excavating the sides of the line in preparation for necessary widening, and, in the course of this work, the bridge, which was covered with ivy, was noticed to be in an unsafe condition. On the previous night, soon after the Dover Continental express had passed, the centre of three arches across the line fell The break-down gang was brought from London to work at clearing the line, and this was done by daylight on the 24th. A telegram was sent from Bromley announcing that the line was clear, and the first London train out passed by the remaining arches of the bridge while the men were under one of them at breakfast. This arch fell and buried eight or nine of the men, gangers and labourers. Seven of them were brought out dead. The inquest was opened on Saturday last, when Edward Pearce, the forman ganger between Bromley and Bickley, was called. He stated that he was present when the accident occurred. On Thursday he noticed that the road on the down-line side was a "little out of the line,"—that it had widened. He examined the bridge, and, seeing that the pier on the down main line had moved, sent at once for Mr. Archer, the superintendent of that part of the road, the witness meanwhile having the bridge watched. The pier appeared to have gone somewhat sideways. Mr. Archer and the witness examined the bridge together, with the result that a telegram was despatched to the engineer's office at Victoria, and Mr. Hewitt, the assistant engineer, came down. He plumbed the bridge, and then gave orders that it should be strictly watched. Between one and four o'clock the brickwork of the bridge opened at the top, just above the pier on the down line, and cracks appeared. Then Mr. Hewitt came again, and gave orders for the bridge to be taken down. The 'men worked all night; the arch over the main line, and the smaller arch over the siding on the down-line side, fell without any warning. The arch over the hut on the up side was left standing. The men got the line clear before six o'clock, in time for the 5·55 train to pass. They then went to breakfast, and were warned to be back at 7·30. Some went to Bromley to breakfast, others into the hut. The witness stopped outside to watch the traffic. At 6·52, while he had his back to the bridge, the third arch fell. The pier fell outwards.

The inquiry was then adjourned until this Friday, December 1st.

Colonel Yolland, on Tuesday, opened a Board of Trade inquiry at Bromley in reference to the fall of the bridge. Evidence was taken as to the inspection of the bridge on the day preceding the accident, and the ultimate falling of the structure. The inquiry was adjourned.

A disaster of a somewhat similar character is reported from Scotland. It occurred on the Great North of Scotland Railway, on the Macduff and Turriff branch of that line, and by it five persons have been killed and eleven seriously injured. The accident occurred at a point on the line two miles from Auchterless Station, and about the same distance from Fyvie. The custom of this railway is to run mixed trains of wagons and passengers' vehicles, and the train which left Macduff at 4·20, due in Aberdeen at six o'clock, was of this description, there being three wagons in front of the carriages. After leaving Auchterless the train passes through a level country for about a mile, and at this distance there is a level crossing, called Gatehouse. From this crossing the line rises till it reaches a bridge over the Ythan, a river about 30 ft. wide. A few hundred yards further on there is a bridge across the Turriff turnpike road. It is an old structure, built more than twenty years ago. It is made of iron, with wooden crossbeams, and there is no railing at the edges of it. The height is about 18 ft. from the level of the road, and its length about 40 ft. It was at this point that the accident happened. Telegrams from the spot state that the engine of the train and the guard's van had passed over the bridge in safety, but when the three wagons were crossing the bridge gave way, and the vehicles were precipitated on to the road beneath. The carriages, in which there were a considerable number of passengers, fell into the chasm, and were piled in a heap. The engine remained on the railway about 200 yards forward from the bridge, but the force of the falling wagons had pulled the tender off the line. The line at the point where the accident occurred is carried on the top of a high embankment, and crosses the Forgue turnpike at a height of between 20 ft. and 30 ft. on an iron bridge supported by wooden beams. It is not stated that the bridge had previously shown any signs of weakness; but it is inferred that the long-continued wet weather may have in some degree lessened the solidity of the embankment, and thus, at the same time, have interfered with the stability of the bridge.

MID-LONDON MARKET.

NOTICE has been lodged of an application to be made to Parliament next session for powers to form a market on some land at the back of the public gardens on the Thames Embankmennt, between Waterloo and Charing Cross Bridges.

This project is rather an extensive one, as, besides erecting markets, it provides for the construction of a new street from the Thames Embankment along the northern side of the public gardens to Villiers-street, which it will join nearly opposite the stairs leading to Charing-cross foot-bridge. There will be outlets from the new street to the Strand by way of Buckingham-street and York-buildings, which have been hitherto *culs-de-sac*, but will now be public thoroughfares.

The market buildings will be arranged on the north side of this new street, in four sections, divided by the intervening streets, but they will be connected together by glazed awnings. Each section will have a ground-floor of 30 ft. high at least, and a lofty basement or lower market beneath, on a level with the Underground District Railway. The Metropolitan District Railway will thus be brought actually into the market by means of a loop-line of rails from Charing-cross Station to a junction near Waterloo Bridge, and the markets will be directly connected with the whole railway system of London and the provinces.

Advantage is taken of the difference in level of about 40 ft. between the Thames Embankment and the Strand, and a high-level roadway in line with Adelphi-terrace is projected to be carried above the back part of the markets, on columns, as far as the houses of Lancaster-place, Waterloo-bridge, with light iron bridges spanning the intervening streets. The market buildings proper will not be raised above the level of the roadway of this terrace, but this terrace will have as a background a row of very lofty buildings, consisting of a large hotel and some blocks of offices and chambers overlooking the market roofs, and forming a connecting link in the river façade between Adelphi-terrace and Somerset House.

The architects are Messrs. Benison & Bargman, of Essex-street, Strand, and the Parliamentary engineer is Mr. E. Wilson, C.E.

DOCKS AND HARBOURS.

Cape Town.—On the 20th of October, the new graving-dock at Cape Town was formally opened, the Union Steamship Company's steamer, *Athenian*, cutting the ribbon and taking up her position in the basin. The water was pumped out of the basin in five hours, and the *Athenian* now lies there shored up, high and dry. The dimensions of the dock are 539 ft. at coping level, 500 ft. at keel-blocks, 90 ft. wide at coping, and 68 ft. at entrance. The depth of water on sill of entrance at low water is 21 ft. and at high water 26 ft. (ordinary spring tides). The blocks are of Poarl granite.

Berwick.—A public meeting of those interested in the proposed fishery harbour at the Green Haven, on the coast about half a mile north of Berwick pier, was held in the Town-hall, Berwick, on the 23rd ult. Mr. W. Henderson read the report of the committee, which stated that they were unanimous in admitting the importance of the proposed harbour to the town and district; that the Duke of Northumberland had agreed to grant the ground at a nominal rent; and the North British Railway Company, the committee believed, would run a branch line to the harbour. It was only proposed to construct section 1 of the harbour, as shown upon the plan, and this could be done at a cost of 24,743*l.*; and as the power of the Harbour Commissioners extended about two miles along the coast to the north they would have to be consulted. The only plan they could see to float the scheme was to get at least one-half of the amount required, and they thought that if they could raise 15,000*l.* they might get a loan of the rest. They thought such a scheme might be considered and tried. Alderman A. Darling, as chairman of the committee, said they had been very fortunate in securing the services of Mr. J. Watt Sandeman as their engineer, and he had produced a large and comprehensive plan. He moved the adoption of the report, and that steps should be taken to carry out the scheme. The motion was agreed to, and a committee was appointed to promote the scheme.

Lerwick.—At the annual meeting of the Lerwick Harbour Trust, on the 22nd ult., with reference to the opposition of Mr. George Hay to the alterations which have been made in the works, which chiefly consist in carrying the pier out from the shore as a solid work, instead of making a connexion with the shore by means of a bridge, a letter was read from Mr. Hay's agents in Edinburgh (Messrs. Mackenzie & Kermack) intimating that the harbour plans had been examined on behalf of Mr. Hay by a firm of engineers, who stated that in their experience they had never seen such a deviation, as was here proposed, from plans authorised by Parliament, and assuring them that the alteration is not authorised by anything within the limits of deviation described in the deposited plans, being simply a substitution of one kind of work for another. It was decided to intimate to Mr. Hay that the trustees were willing to undertake, but without prejudice as to their claim on the pier, that the depth of water at Hay's pier would be maintained, and that the contract for the erection of the works would be ready for signing at an early date.

COMPETITIONS.

The Wallace and Bruce Statues, Edinburgh.—The sub-committee of the Lord Provost's Committee on the Wallace and Bruce Memorial met on Tuesday last, and decided that none of the competitive designs previously noticed were of sufficient merit to justify them in recommending the Town Council to proceed to carry out the bequest of the late Hugh Reid. In acknowledgment of the trouble to which the competitors (eight in number) had been put, they agreed to recommend that each should receive the sum of 10*l.* They further recommended that, in the meantime, the Reid Bequest money should be allowed to accumulate.

COMPENSATION CASE.

CLOSE *v.* METROPOLITAN BOARD OF WORKS.

ON Wednesday last, at the Sheriff's Court, Westminster, before Mr. Under-Sheriff Farrer and a special jury, the case of Close *v.* Metropolitan Board of Works, was heard.

This was a case in which the question to be determined was the amount to be paid by the Metropolitan Board of Works for the freehold premises of Mrs. Close, No. 3, Moor-street, Soho, taken for the new street from Piccadilly-circus to Oxford-street, and for compensation for disturbance of her business as a baker. The amount claimed was 4,790*l.*,—viz., 2,200*l.* for the freehold property, 2,500*l.* for damage to business, and 90*l.* for fixtures.

The evidence for the claimant consisted of that of Mrs. Close and other witnesses who had examined the books, and they calculated the profits of the business at 518*l.* per annum, on which five years' purchase was claimed.

Various estimates of the value of the freehold were given.

On behalf of the Metropolitan Board of Works, Mr. Dwarber, Fetter-lane, made out the profits to be only 320*l.* a year, and it was maintained that only 1½ year's purchase should be given,—say, 500*l.*

As to the freehold, the witnesses put the value at 1,540*l.*,—making 2,040*l.* altogether.

Counsel on each side having addressed the jury, the Under-Sheriff summed up, and the jury found a verdict for 3,375*l.*

REMOVAL OF STREET SLUSH.

SIR,—In a recent issue you mention the trial of new watering and sanding machines in London.

Along with these there is much need of a more economical and expedient way of removing slush than that employed at present, viz., shovelling it into open carts in the thoroughfares. Such a method is certainly not in keeping with progress, when other means are at hand.

The vacuum cylinder or drum is not a thing of to-day. It has been used in a Northern city for removal of the contents of urinals, &c. While the machine is being driven along it works an air pump, which forms a vacuum in the cylinder. When a certain vacuum is reached (which is shown by a gauge), an iron pipe, with india-rubber hose connexion, is let into the sunken hogshead or tank; then the tap is opened, and the whole contents rush up into the cylinder without any splashing or inconvenience whatever to the traffic.

If such a machine was thought too complicated, there are plenty of chain or india-rubber valved pumps made to pump slush that could be fixed to the back of water-tight carts, and worked by hand, which could easily remove the contents of any slush-receptacle.

T. T. L.

OLD FORD ROADS.

SIR,—What is the General Rate? The demand-note says, highways, cleansing, lighting, &c. Surely this is wrong, as a visit to Monier-road, Old Ford, will show.

The road is certainly indifferently lighted, but the cleansing appears on paper only, for both road and pathways are nothing but mud, slop, and slime. The slop lays in the road until it is covered with a green slime.

Is this conducive to the health? I suppose when an epidemic breaks out we shall have inquiries and inquests. Then things will be altered. Is not prevention better than cure?

H. SMITH.

INDEX TO THE *BUILDER*.

SIR,—Ten years ago a suggestion was made in the *Builder* that, with thirty years of existence, a complete index for the time being was absolutely necessary to all those who had to search its pages for information they might be in need of.

This necessity is rendered still more pressing now that another ten years of much bulkier matter has been added. Cannot this complete index be compiled by a staff of volunteers? I think they might be found, and that the sale would guarantee the venture.

T. P.

CLIFF & SONS *v.* COTTRELL.

SIR,—Our attention has been called to the report of the above case in your issue of the 25th ult., and as it is calculated to convey an inaccurate impression of the grounds of the verdict, may we request you to give publicity to the fact that the case was decided on a technical point that the bricks delivered did not correspond with the exact description ordered,—a matter on which there was a quantity of conflicting evidence?

SCATCHERD & HOPKINS,
Solicitors for the Plaintiffs.

Books.

Greece, Pictorial, Descriptive, and Historical. By CHRISTOPHER WORDSWORTH, D.D., Lord Bishop of Lincoln. A new edition. London: John Murray.

THIS is a handsome republication of an old work, the title of which, we may observe, is very absurdly worded, implying that it is Greece which is "Pictorial, Descriptive, and Historical," whereas it is the book which is understood to have those qualities. It is surprising that so good a scholar as the Bishop of Lincoln should originally have permitted such an illogical arrangement of words on his title-page. However, if there is little in a name, there is not, perhaps, much more in a title-page, and the re-publication of a book containing in one large volume so much in the way of description, comment, and pictorial illustration about Greece will probably be welcome, as the book has become one of that class of which it is said that "no gentleman's library can be considered complete without it," and the new generation may wish to supply this deficiency in their shelves. It is hardly to be supposed that a book on Greece published a good many years ago will be in its illustrative department equal to what is expected now in a book on such a subject on a large scale; better illustrations are found in many much cheaper books at the present day. But the general view of the history, aspect, and associations of the country, given by a man of extensive learning and refined mind, retains its value, and the rather old-fashioned style of the illustrations is a not unpleasing reminder of earlier days, and an interesting example in regard to the change which has come over book illustration of late years. The book is prefaced by a long introductory chapter, or rather essay, on the characteristics of Greek art, by Mr. Geo. Scharf, which he has revised, and to which, we imagine, some new illustrations have been added; we have not the original edition by us for comparison. We may presume that some care has been expended in the revision of this part of the work, on bringing the information up to the level of the present standard of knowledge, though we do not see any reference to the new theory as to the method of lighting the Parthenon. The present editor, Mr. H. F. Tozer, has added a few paragraphs in their proper places, relative to the recent discoveries at Mycenæ, Olympia, and elsewhere; and this he has done with great care and judgment, so that the interpolated passages appear to come in naturally and as if part of the original work, and no "joinings" are perceptible. A view of the street of tombs on the road from Athens to Eleusis is one addition to the illustrations. Binding and paper are all that could be wished,

and the book may be recommended to the notice of the many persons who do not possess a copy of the original edition, as well as to libraries, private or public, in course of formation.

The Metropolitan Building Acts: a Text-book for Architects, Surveyors, Builders, &c. By Banister Fletcher, F.R.I.B.A. London: B. T. Batsford, High Holborn. 1882.

The edition of the Metropolitan Building Act published by Mr. Banister Fletcher some years ago being out of print, he has issued another with the addition of recent additional Acts of Parliament and other necessary matter,—the Amendment Act of 1878, the General Orders published by the Board of Works, and the most recent information as to liability in respect of the paving of new streets and the local management Acts. To save his readers the trouble of referring from page to page and to foot-notes to find all the information that relates to the same matter, Mr. Fletcher has sought to bring all the information together, including cases that have been settled, the majority quoted from our own pages. While this has a certain usefulness, the user of the book must be careful to distinguish between what is the actual law and what are merely the opinions of the writer and quotations from newspaper reports, which have no weight in court. They afford, nevertheless, much valuable information.

The Magazine of Art. Vol. V. Cassell, Petter, & Galpin, London, Paris, and New York. 1882.

The volume for 1882 of this art-periodical contains a good many articles of interest, and a large number of mostly good illustrations. Architecture and ornamental art are fairly represented among the papers contributed. In an article on "The Venice of Titian" (a very interesting subject) by Mr. Wyke Bayliss, the point is, however, rather missed by the mis take of drawing the illustrations so as show the buildings looking like old ones, which were comparatively new in Titian's day; a curious mistake, as one would have supposed the very object of such an article should have been to show sketches and suggestions of Venice as the place would have looked at that date. An article on the New Law Courts by Mr. W. Armstrong is noticeable as being one of the few attempts we have seen to form a reasonable critical judgment of the building. Mr. Armstrong, while writing with cordial appreciation of some of the detail of the building, has the independence to speak strongly as to what he calls the "almost malicious disregard of symmetry" in many parts of the building. He goes on to say,—"There are six towers all different, though all of very squat proportions; there are eight façades, counting those in the great or eastern quadrangle, and they are all, with the doubtful exception of that which faces Clement's Inn, broken up into so many parts and into such unsymmetrical masses, that no one of them is much more expressive than if it were made up of half a dozen buildings by as many different architects. Such want of coherence was appropriate enough in the great Mediæval buildings upon which Mr. Street has modelled his art. They were usually the work of several generations, and as they received successively the impress of many directing minds, their irregularity was a natural growth, and was as true in expression as it was picturesque. In these days of what may be called Romantic architecture, it is too often forgotten that a picturesque *ensemble* is in its very nature irreconcileable with a great artistic conception. The latter cannot exist without unity, symmetry,—in a word, without individuality; but the qualities which make a building picturesque are identical with those which deprive it of individual expression." We are not sure that Mr. Armstrong has used quite the right word here, unless he means the word "individual" to be taken in its more literal sense, as denoting a building which must be considered as a whole and not in divided portions. It is not impossible for an architect to design a picturesque building which may show his own individuality of taste. It would have been truer to say that a great conception will be homogeneous, and what is usually called a picturesque building is not so. "His meaning is goot," however, and we are glad to find a thoughtful artist like Mr. Armstrong concurring in the views about the Law Courts building which had been already expressed by ourselves.

Mr. Champneys has contributed one or two articles on Wren and his works; there is one on Alnwick Castle; and among articles on decorative subjects is one by Mr. G. Wallis on "Decorative Ironwork," with some illustrations of very piquant and charming ancient designs of various types. The affectation at the close of this article and in other places of shading part of the page so as to make it appear as if it were a separate leaf pasted in and curling up from the background, is a piece of foolishness which should be avoided in future. Among miscellaneous contributions is a very well written paper, by Mr. R. L. Stevenson, on Bagster's illustrated edition of the "Pilgrim's Progress," with reproductions of some of its small and quaint anonymous woodcuts. We entirely agree with Mr. Stevenson as to the suggestive interest of many of them; they were quite worth calling attention to; those illustrating "The Chamber called Peace" and "The Enchanted Ground," and one or two others, are almost worthy of Blake.

VARIORUM.

Longman's Magazine, No. 2, has a considerable instalment of a serial story, by Jas. Payn ("Thicker than Water"), and contributions by Samuel Smiles, R. A. Proctor, J. A. Froude, Mrs. Oliphant, and others. If kept up to this mark it can scarcely fail to succeed.——The *Gentleman's Annual*, Christmas, 1882 (Chatto & Windus), includes four stories, all pleasant reading, the principal one, "Day and Night," being by Mr. Francillon. —— The *Belgravia Annual* for Christmas (same publisher), contains matter of the same kind, with the addition of a number of illustrations.——The *Ship Canal Gazette*, just now produced, is devoted to the movement having for its object the constitution of Manchester as a port for ocean-going vessels. This would seem to show that the movement is a wide one. —— Arrowsmith's "Christmas Annual" for 1882 has the title of "Brown Eyes," by May Crommelin, and is a pleasantly-written and stirring story.——"The Bow of Strength" is the title of the *Quiver* Annual for 1882, and with its coloured cover and many woodcuts certainly a good sixpennyworth. ——Then comes "Our Happy Family," the *Little Folks'* Annual, Harrison Weir and Ernest Griset being chief amongst the illustrators.—— Cassell's *Illustrated Almanac* for 1883 has a good print on every other page, and sometimes more.

CHRISTMAS CARDS.

Eyre & Spottiswoode have sent us a long catalogue of the cards published by them for the coming Christmas and New Year, and a specimen packet. Executed under the manager of last year, Mr. W. G. Wallis, and in many cases by the same artists, the results, so far as we see, are entitled to the same praise we gave on that occasion. The sale of such cards appears to be ever augmenting: every shop-window in some parts of town is full of them.

Miscellanea.

The New Scottish Conservative Club-house, Edinburgh, was opened by the Marquis of Salisbury on the 23rd ult. The club, which was founded at a meeting held in 1877, originally started with a membership of 1,000. The number has been increased from time to time, and as the limit was exceeded by the applications, recently the club adopted a resolution to increase the membership to 2,000. The constantly-growing membership rendered the temporary premises first occupied inadequate, and the erection of a new club-house was found necessary. In the summer of last year building operations were begun. The site has a prominent frontage in the centre of Princes-street. The design was furnished by Mr. Robert Rowand Anderson, A.R.S.A.

Didcot, Newbury, and Southampton Railway.—The directors of the Didcot, Newbury, and Southampton Junction Railway, at a meeting held a few days since, resolved that the works at Southampton should be commenced as soon as the specification and plans (now in active preparation) are completed. For these (with the exception of earthworks) tenders will be invited from local firms, the contract for the general construction of the railway being in the hands of Messrs. Falkiner & Tancred.

The Health of the Army of Occupation in Egypt.—We learn that with the view of maintaining the health of the 11,000 or 12,000 troops now in Egypt (of whom about 9,000 are in Cairo and 2,500 at Alexandria), the barracks both at Cairo and Alexandria are undergoing a thorough painting and cleansing. They are mostly lofty buildings, but, as is well known, they were in a condition of horrible filth and dirt when first entered by our men. The sanitary arrangements in these buildings have been improved as much as possible, and the "dry-earth system" has been resorted to and applied in the manner practised in India. The hospital accommodation at Cairo was at first, owing to the condition in which the public buildings were found to be, hardly sufficient, but the cleansing process having been now completed, it is stated to be ample for all probable contingencies. In the citadel there is room for some 280 beds. The situation of this place, which is the highest in Cairo, is well suited for the purpose, and the rooms are lofty and well ventilated. At Abbasieh there is a second hospital of 300 beds, and at Ghezireh there is a third; but this is a tent-hospital, and it is capable of holding a varied number. There is a building near Abbasieh which is being prepared for a hospital; it is an isolated place, and is reported to be suitable for the purpose. At Alexandria the principal hospital is a building, consisting of four large sheds, facing the sea, which will hold 300 beds, and it is contemplated to supplement it by the equipment of a hulk hospital capable of holding 200 patients.

The New Works of the Metropolitan Railway Company, Neasden.—The new works at Neasden for the Metropolitan Railway Company have been completed. The second portion of the contract was placed in the hands of the firm of B. N. Smith & Son, contractors, The Crescent, Birmingham, who commenced the work in November last year. Since that time upwards of four million bricks have been laid. The buildings, which are of a substantial description, cover nearly six acres of ground, and consist of the following blocks:—General engineers' offices, builders' workshops, permanent way and signal shops, locomotive shops, erecting, fitting, and turning shops, boiler-house, carriage and carriage-painting sheds, stoves, drying-sheds, gas-house, saw-mills, &c. The whole of the work has been carried out under the superintendence of the engineer to the company, Mr. J. Tomlinson, jun., who is to be congratulated upon the quality of the work turned out under his hands; and the contractors also deserve credit for the expedition with which the whole of the job has been completed, under the sole direction of their able and energetic manager, Mr. Henry Charlton. The whole of the ironwork, viz., columns, girders, and roof-work, has been executed by the firm of Messrs. Stanley, Hall, & Co. In connexion with the above works, and to celebrate the completion of the contract, a dinner was given by the contractors at the Spotted Dog Hotel, Neasden, when about forty sat down, and a most enjoyable evening was spent.

Fire at Clevedon-court, Somerset.—On Monday morning the residential portion of Clevedon Court, Somerset, the seat of Sir Arthur Hallam Elton, was entirely destroyed by fire, believed to have originated with a beam in one of the chimneys becoming ignited. The Court was one of the few old manor-houses that continue to be used as such. Dating from the time of Edward III., it was restored in the Tudor period, and though it had since been restored and altered, many of the old rooms and offices were perfect. The south front, with its traceried windows, quaint gables, and variously ornamented window-shafts, has been saved, with the entrance-porches and grand hall. It is stated that the occupants of the Court had been a little alarmed for two days past by the smell of smouldering wood in some of the rooms, but all efforts to discover the cause of it had failed. Early on Monday morning the library fire was lighted, and about eight o'clock a servant went to light a fire in a spare room over the library, and found it full of dense smoke. Hastening into an adjoining room, she discovered that it was in flames. A good many of the books were saved, with some valuable title-deeds and ancient manuscripts.

Chiswick.—We understand that Mr. Henry Oliver Smith, C.E., has resigned his appointment as Engineer and Surveyor to the Chiswick Improvement Commissioners in favour of private practice.

Demolition of the Camberley Obelisk.—The *Reading Mercury* says that this obelisk, one of the oldest landmarks to be found in that part of the country, has just been partly demolished. The obelisk could be seen for miles round, and has for about a century been a guide to travellers. It appears that the gentleman who has recently bought "The Knoll" on which it stands has had the building surveyed by Mr. Allcock, contractor, Camberley, who has pronounced it unsafe at a point about 40 ft. down. The owner consequently ordered its removal down to the defective part. The contractor obtained some good photographs of this interesting relic before commencing the work of demolition. Popular tales say the obelisk was built by a king for the purpose of watching fox-hunting, another similar story stating that it was put up as a landmark for fox-hunters, while other accounts declare it to have been a signal station. The authentic particulars, which are not generally known, are that it was built by a Mr. Norris (who lived at Hawley House, Blackwater), in order to communicate by flags with High Wycombe Church, in Buckinghamshire (twenty-seven miles as the crow flies), with the Dashwood family, with whom he was very intimate. There was originally a gallery round the top, and a ball on the summit. About the time when the Royal Military College was removed from Marlow to Sandhurst (in 1812 or 1814), the obelisk formed a favourite landmark for drivers after leaving Wokingham. As there were at that time few trees about, it was much more prominent than it has latterly been. Some gipsies who encamped in the obelisk, and lighted a fire, are said to have burned the staircase down.

English and American Locks.—The *Irish Manufacturers' Journal* says,—"An English merchant who was asked 5 per cent. advance on last years' prices for English-made locks objected, adding that 'English lockmakers would not be so ready in advancing prices if they knew what large orders I am sending to America by mail,' and admitted, on being questioned as to what advance in price those orders were subjected, that it was 45 per cent. Thereupon a local correspondent regretfully writes, this is not an isolated case, nor is such experience limited to the lock trade, and that "it seems to be the fashion among certain English merchants to beat down the price of the manufacturers to a semi-starvation point and to give, without a murmur, whatever price the Yankee rival likes to charge.' Now, the fact is that for years the English locks for general use have been of the poorest kind of make, so unreliable and dear-at-any-price, that the entrance long since of the well-made and trusty Yankee locks into successful competition was easily made and has been easily retained. It is all well enough to blame the English merchant, but '44 per cent.' never suits him without a very good reason indeed for it."

Bishop Heber's Bath.—The neglected state of the bath at Trichinopoly, in which Bishop Heber lost his life, and the subject of the preservation of this most interesting relic, having been brought under the notice of the Government, the Right Hon. the Governor, who in July last personally visited the locality, has decided that the bath should be protected by an ornamental iron railing, placed at a sufficient distance to prevent interference with the water. The bath is to retain its original character, and arrangements are to be made for keeping it always full and properly conserved. Mr. Grant-Duff has also directed the following inscription, drawn up by the Bishop of Madras, to be carved on a slab, and erected on the side wall:—"In memory of the devoted, accomplished, beloved, and universally honoured Servant of God, Reginald Heber, D.D., third Bishop of Calcutta, and one of India's truest and most loving Benefactors; this Stone was erected in the year 1882, at the expense of Government, on the margin of the bath in which he was drowned while bathing on the 3rd of April, 1826. His body was laid under the chancel of the Church of St. John, Trichinopoly, in the hope of the resurrection of the just to eternal life through Jesus Christ."—*Pioneer.*

The Civil and Mechanical Engineers' Society will hold their opening meeting of the session 1882-3 on Thursday, December 7th, when the president, Mr. R. Harkness Twigg, M.I.C.E., will deliver his opening address. This Society offers many advantages, more especially to the younger members of the profession.

Fatal Scaffold Accident at Hungerford. A terrible accident which happened to a stone-carver named William Finlay, at the new London and County Bank buildings, on the 10th ult., has unhappily terminated fatally, the poor man having died at midnight on the 20th ult. from the effects of his injuries. On the 21st an inquest was held before the borough coroner. Henry Hart, stone-carver, of Clapham-road, London, said deceased was forty-two years of age, and was a very nervous man, and subject to giddiness, but he was careful, and no serious accident had previously befallen him. William Grimes, of Sunninghill, apprentice plasterer, who was at work in the top front room at the time of the accident, said he saw deceased walking timidly on two planks resting on carpenter's stools, and from these he stepped down, left foot first, to a platform about 2 ft. lower. Immediately he did so he went through and fell to the bottom, about 30 ft. He did not jump, but stepped gently from the planks to the platform. Richard Wells, labourer, who was at work on the scaffold, said he heard the crash, and on looking saw deceased disappear and strike against another platform lower down, from which he rebounded and fell to the ground, being struck in the back as he fell. Witness believed the plank to be perfectly safe, and said stones weighing 4 cwt. or 5 cwt. had been hauled up on to it. The jury found a verdict of accidental death, and that no blame attached to any one in connexion with the sad event.

The Water Supply of Edinburgh.—At a meeting of the Royal Scottish Society of Arts on the 27th ult., Mr. Alex. Leslie, M. Inst. C.E., read a paper on "The Water Supply of Edinburgh." Mr. Leslie, after stating that the city is now in possession of a supply of water inferior to none in quantity, quality, and cheapness, gave some particulars regarding the history of the water supply of Edinburgh, from the inauguration of the first gravitation supply in 1681, before which time Edinburgh had to rely on wells. He also detailed the Parliamentary proceedings which led up to the appropriation of the present supply from Moorfoot. Going on to describe in detail the various Moorfoot works, he mentioned that the area occupied by Gladhouse reservoir was 390 acres, and that it was capable of containing 1,700 million gallons, while Portmore had an available capacity for 250 million gallons. It was estimated, he said, that when the whole of the works were completed, there would be an available supply of 17 million gallons per day, or double what the maximum supply was before the Moorfoot water was introduced. Alluding to a prophecy that had been made, to the effect that the presence of large accumulations of water in the various districts would be damaging to the surrounding properties, by causing cold, damp winds, he stated that this view had been found to be erroneous; and that the farmers were of opinion that the land was benefited by the presence of the water, inasmuch as they found that the frost was much less intense than formerly.

Proposed Market for Chelsea.—It is intended to apply to Parliament for powers to erect a new market in the Fulham-road. The site lies between Sydney-street and College-street. The inhabitants ought to keep their eyes open.

Eastbourne Proposed Town-Hall.—If we printed what is sent to us on this matter we should be liable to an action for libel. Suffice it that the matter is at present at a dead-lock. The plans are said to have been insufficient for the quantity-surveyor.

Midland Great Western Railway of Ireland.—Mr. G. Newenham Kelly, C.E., has been appointed by the directors as chief engineer of this company, in succession to the late Mr. R. R. Greene.

TENDERS

For premises in Blackfriars-street, Manchester, for Messrs. John & James Carr & H. G. Nicholson. Mr. E. S. Titmas, architect, 48, Arcade-chambers, St. Mary's Gate. Quantities supplied by Mr. J. H. Andrews:—

Carlyle	£16,309 0 0
Parkinson	16,200 0 0
Acton	15,840 0 0
Wilson, Toft, & Huntley	15,462 0 0
Davies & Maudsley (withdrawn)	15,317 0 0
Webster (revised)	14,700 0 0
Brown & Sons	14,700 0 0
Niell & Sons (revised)	14,400 0 0
Southern & Sons* (revised)	14,310 0 0
Herd (revised)	14,303 0 0
Macfarlane (too late)	14,000 0 0

* Accepted.

For the erection of a new Training College, Saffron Walden, for the British and Foreign School Society. Mr. Edward Burgess, architect, 39, Great James-street, London. Quantities by Mr. Wm. Thornicroft:—

Giles Bros.	£15,950 0 0
Frost & Co.	11,950 0 0
D. S. Rice	10,818 0 0
J. Sharman	10,590 0 0
H. Everett & Son	10,490 0 0
T. Glasscock & Son	10,400 0 0
D. C. Jones & Co.	10,380 0 0
B. E. Nightingale	10,292 0 0
G. Dobson	9,980 0 0
W. Bell & Sons	9,978 0 0
G. Grimwood & Sons	9,890 0 0
D. Dix	9,777 0 0
T. H. Kingerlee	9,640 0 0
G. Thackray & Son	9,389 0 0

For the erection of a new school in Willow-street, Leicester, for the Leicester School Board. Mr. Edward Burgess, architect. Quantities by Mr. W. Thornicroft:—

T. & H. Herbert	£3,650 0 0
Bland	3,497 0 0
Plant	3,489 0 0
Hutchinson & Son	3,376 0 0
F. Major	3,467 0 0
J. C. Kellett	3,300 0 0
Clark & Garrett	3,270 0 0

For building eight cottages on the estate at Darenth, for the Managers of the Metropolitan Asylum District. Messrs. A. & C. Harston, architects, 15, Leadenhall-street:—

Thomerson & Son	£3,520 0 0
Wenham	3,313 0 0
Crockett	3,235 0 0
Tongue	3,150 0 0
Shurmur	2,970 0 0
Hearle & Son	2,883 0 0
Balaam Bros.	2,875 0 0
Gumbrell	2,805 0 0
Blake	2,690 0 0
Lonergan	2,624 0 0
Priestley & Gurney	2,594 0 0
Brightmore	2,547 0 0
Richardson	2,543 0 0
Waite, Dartford (accepted)	2,108 15 6

For the reconstruction of the drainage of the Workhouse and Infirmary, Marloes-road, for the Guardians of Kensington, according to specification and schedule of prices prepared by Messrs. A. & C. Harston, architects, 15, Leadenhall-street:—

	Percentage above Schedule Prices.		At Schedule Prices.		Percentage under Schedule Prices.
J. Phillips	17½	.....	—	.....	—
Nightingale	15	.....	—	.....	—
Lavers	—	.....	at	.....	—
Mowlem & Co.	—	.....	at	.....	—
McKenzie, Williams, & Co.	—	.....	at	.....	—
Crockett	—	.....	—	.....	5
Standan	—	.....	—	.....	5
Nowell & Robson	—	.....	—	.....	5
Bottoms Bros.	—	.....	—	.....	6
Kellett & Bentley	—	.....	—	.....	10
Bentley	—	.....	—	.....	12½
Beach	—	.....	—	.....	15
Mears, Hammersmith*	—	.....	—	.....	20

* Accepted.

For alterations and repairs to Marlesford Lodge, Hammersmith, for the Managers of the Kensington and Chelsea School District. Messrs. A. & C. Harston, architects:—

Nightingale	£573 0 0
Nash	520 0 0
Crockett	510 0 0
Shearman & Son	482 4 0
Lavers	404 0 0
Derby, Limehouse (accepted)	385 0 0

For shop-fronts, High-street, Stoke Newington. Mr. H. J. Newton, architect, 27, Great George-street:—

Lamble	£228 0 0
Royal	226 0 0
Maton	221 0 0
Cork	216 0 0
Pickersgill Bros. (accepted)	213 0 0

For new Wesleyan Sunday Schools, Harpur-street, Bedford. Messrs. Usher & Anthony, architects and surveyors, Bedford:—

E. Twelvetrees, Biggleswade	£2,995 0 0
T. Spencer, Bedford	2,598 0 0
S. Foster, Bedford	2,497 0 0
Corby & Freshwater	2,471 0 0
Adams, Warton, & Walker*	2,376 0 0

* Accepted.

For alterations at Woburn Sands, Beds, for Mr. Henry Down. Messrs. Usher & Anthony, architects:—
S. Foster, Bedford (accepted).

For the erection of the Church of St. Anne, Bagshot. Mr. H. A. Cheers, architect:—
Joseph Higgs, Upper Park-place, London (accepted).

For alterations, additions, and repairs to the Mission Hall, St. Anne's-road, Stamford Hill. Mr. Jesse F. Scott, architect:—

H. Brown	£580 0 0
F. W. Smith	496 0 0
W. Shurmur (accepted)	495 0 0

For shop-front, 118, High-street, Stoke Newington, for the Incorporated Society of Licensed Victuallers. Mr. H. J. Newton, architect:—

W. Shurmur	£169 0 0
Langmead & Way	163 0 0
Pickersgill Bros.	149 0 0
Cook	148 0 0

For new brewery offices, for Mr. J. Smith, Tadcaster, near York. Messrs Scamell & Colyer, architects, 18, Great George-street, Westminster. Quantities by Messrs. R. L. Curtis & Sons, London:—

Building.

Armitage & Hodgson, Leeds (accepted)	£3,495 0 0

Ironwork.

Dawson & Nunneley, Leeds (accepted)	£393 0 0

For the erection of schools for the Sutton School Board. Messrs. Gordon & Lowther, architects, 1, Guildhall-chambers, London :—

Tribe	£10,060	0	0
Gregory	9,992	0	0
Ward	9,907	0	0
Merritt & Ashby	9,885	0	0
Smith & Bulled	9,835	0	0
Humphris	9,789	0	0
Loe & Son	9,730	0	0
Hobbs	9,523	0	0
Pearson	9,497	0	0
Clarke & Bracey	9,483	0	0
Prebble	9,386	0	0
Stewart	9,338	0	0
Deacon & Co.	8,996	0	0
Keal	8,862	10	0
Potter (accepted)	8,840	0	0
Longley	8,780	0	0
Dawson	8,590	13	0
Arney	6,368	0	0

For war-house at Limehouse, for the Oil-Seed Crushing Company (Limited) :—

Perry & Co.	£3,165	0	0
Crabb	2,700	0	0
Miller	2,650	0	0
Adcock	2,632	0	0
Boyce	2,590	0	0
Scott	2,540	0	0
Stiff	2,488	0	0
Smith	2,400	0	0
Abraham	2,390	0	0
Johnson	2,359	0	0
Holland	2,352	0	0
Parrish & Hawker	2,325	0	0
Russell	2,300	0	0
Tarrant & Son	2,294	0	0
Hunt	2,280	0	0
Beach	2,267	0	0
Hawkings	2,220	0	0
Capsey	2,175	0	0
Bentley	2,084	0	0
Croaker	2,075	0	0
Shurmur	2,070	0	0
Salt (accepted)	2,045	0	0
Ford (informal)	—		

For Crouch Hall road and sewer, on the Crouch Hall Estate of the Imperial Property Investment Company (Limited) :—

F. A. Jackson & Son	£2,900	0	0
Jas. Bloomfield	2,520	0	0
McDowell & Dawson	2,360	0	0
John Bell	2,349	0	0
Jesse Jackson	2,322	0	0
J. Pizzey	2,282	0	0
T. G. Dunmore	2,281	0	0
J. Strachan & Co.	2,150	0	0
W. Nicholls	2,054	0	0
McKenzie, Williams, & Co.*	2,033	0	0

* Accepted.

For reconstructing the County Hall, Bala. Mr. G. C. Richardson, architect, Warwick House, Shepherd's Bush, and Llangollen. Quantities by the architect :—

Samuels, Wrexham	£1,744	0	0
W. Jones, Portmadoc	1,650	0	0
Jones & Son, Criccierth	1,555	0	0
Jenkins & Jones, Johnstown, Ruabon	1,468	6	0
Meakin & Dean, Bala	1,442	0	0
Evans & Morris, Llangollen	1,381	0	0
W. & G. Thomas, Oswestry	1,349	0	0
Evan Jones, Bala*	1,313	0	0

* Accepted, subject to certain reductions.

For alterations and additions, 55 and 56, Pall-mall, for Messrs. Cater & Co. Mr. John Scott, architect :—

W. Crockett	£1,950	0	0
W. A. Rhodes	1,760	0	0
Wall Bros.	1,750	0	0
Hermon	1,747	0	0
C. Ansell	1,697	0	0

For foundations, for Messrs. Hillman, Herbert, & Cooper, Premier Works, Coventry. Mr. E. J. Purnell, architect :—

Hallam, Coventry	£230	0	0
Garlick, Coventry	215	0	0
Haywood, Coventry	196	0	0
Smith, Kenilworth (accepted)	169	10	0

For fitting shop, offices, &c., for Messrs. Hillman, Herbert, & Cooper :—

Marriott, Coventry	£2,100	0	0
Haywood, Coventry	1,800	0	0
Smith, Kenilworth	1,795	0	0
Garlick, Coventry (accepted)	1,385	0	0

For high level sewer 12-in. pipes, in the Dovercourt-road, for the Council of the Borough of Harwich. Mr. Ditcham, borough surveyor. Quantities supplied :—

Betts & Gillingham, Clacton-on-Sea	£1,389	0	0
J. W. Neave & Son, London	1,356	0	0
Hoare & Son, London	972	0	0
Jas. C. Trueman, London	875	0	0
E. S. Gunn, Harwich	749	0	0
Saunders & Son, Dedham	685	0	0
W. Wood, Chelmsford	685	0	0
Capsey, Stamford Hill	683	0	0
R. Nicholson, Southend	650	7	7
Wm. Nicholls, Wood Green	640	0	0
John Moran, Harwich	606	6	11
H. L. Wright, Peckham	598	10	0

For alterations and additions to the Presbytery, St. Mary's, Chislehurst, for the Right Rev. Monsignor Goddard. Mr. E. Ingress Bell, architect :—

H. Balding (accepted).

For alterations and new shop-front to 35, Brewer-street, Regent-street, for Mr. Austin. Messrs. Nylson & Long, architects, 21, King William-street, Strand :—

R. A. Lamprell, Brixton (accepted).

For new shop-front and fittings at Strutton Ground, Westminster, for Messrs. Kearley & Co. :—

R. A. Lamprell, Brixton (accepted).

For additional rooms to Milverton, Burgess Hill, for Mr. Thos. Cracknell. Messrs. R. S. Hyde & F. W. Hyde, architects, Brighton :—

S. Norman, Burgess Hill	£270	0	0

For new stables, &c., at Burgess Hill :—

S. Norman	£280	0	0

For roadways and sewers, Sutton Court Estate, Strand-on-the-Green. Mr. E. F. Roberts, architect, 3, The Grove, Hammersmith :—

	Contract A.	Contract B. For completing roads, pathways, &c.
Hollingshead	£1,211 0 0	£1,038 0 0
Johnson	1,189 0 0	1,010 0 0
Alldred	1,098 0 0	953 0 0
Carter	847 0 0	1,121 0 0

TO CORRESPONDENTS.

C. W. M. (declined. The sooner the statue is taken down the better).—N. W. (the question how to get rid of ants in a house has been answered several times in our pages, but apparently not very satisfactorily).—G. M. (we do not give addresses).—C. T. H. (we believe the Society in question one of the safest).—R. C.—G. C. R.—R. A. L.—P. P. P.—H. B.—Fairplay.—J. W. H.—J. D. S.—J. A. S.—H. S.—S. F. M.—W. E.—E. L. T.—F. H.—J. C.—S. C.—E. J. P.—H. B.—H. J. N.—Sir B. G.—E. F. R.—W. S.—H. D.—A. R.—J. P. H.—W. E. M.—U. & A.—B. & B.

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